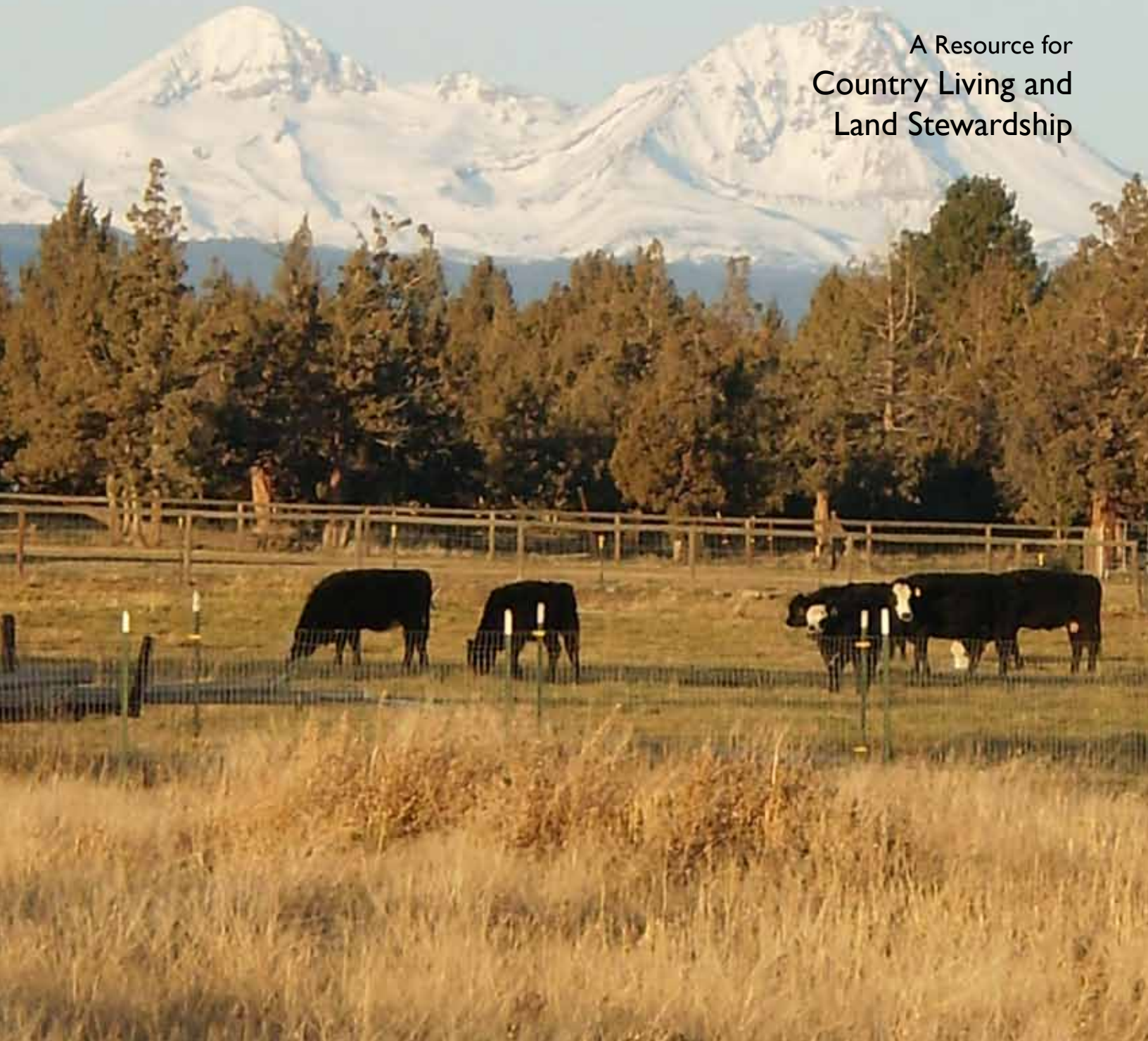
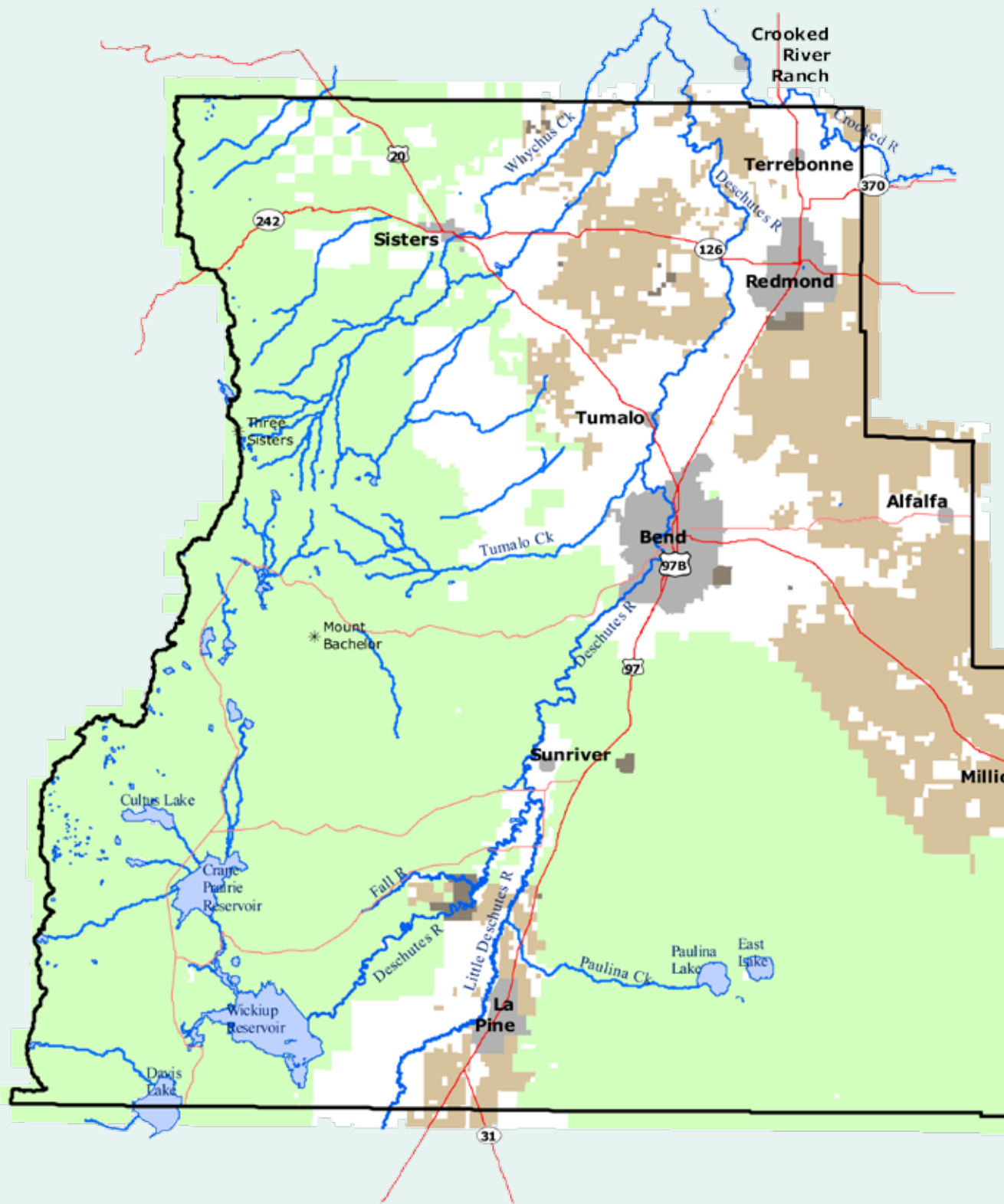


# DESCHUTES COUNTY

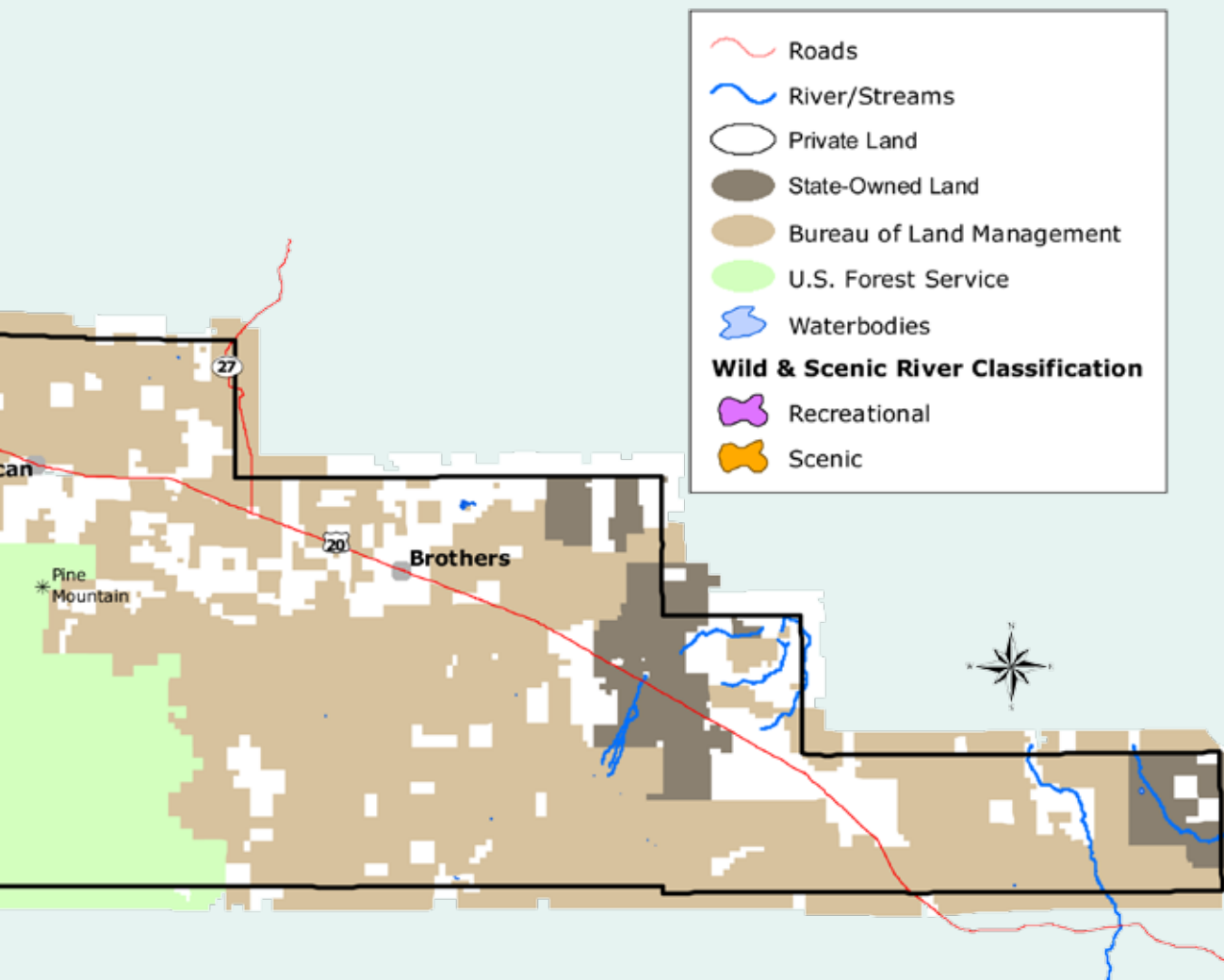
## Rural Living Handbook

A Resource for  
Country Living and  
Land Stewardship





# Deschutes County Oregon



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# Is Rural Living *for* You?

**T**his handbook is designed to introduce current and prospective rural landowners to land stewardship resources. Often, newcomers accustomed to services normally provided by urban governments are surprised by the hard work required to manage rural property. Relating with neighbors can become helpful or difficult, depending on how you manage your rural property.

Use this handbook as a resource in determining whether rural life is for you. It contains information about agencies and organizations that can help clarify regulations, policies, rights and planning decisions during a transition to living in rural Deschutes County. It provides answers to general questions, including those on land-use planning, gardening, irrigation, livestock management, forest and range management, and wildlife concerns.

## Unexpected Challenges of a Rural Lifestyles

- You risk water scarcity during years of drought.
- The cost of living and maintaining the land increases over time.
- Fires near your property could be a risk to you and your animals' health.
- You lose a pet or livestock to a predator.
- You are responsible for a fire that starts on your land and spreads to other properties.
- Deer eat everything you just planted.
- There is no garbage service where you live.
- You are surprised at the cost of building structures needed to protect livestock from predators.
- You don't have enough time or energy to irrigate, mow fields, maintain fences, spray weeds, feed livestock, deal with muddy facilities, doctor sick animals or vaccinated healthy animals.
- Your domestic or agricultural water source has dried up.
- You have to go through the Ground Water Mitigation Process to dig a well on your property.
- Minerals or pollutants have entered your well.
- It takes more time and money to drive to town than you expected.
- It takes more time to learn about and maintain wells and pumps, sewer systems, irrigation pumps, ditches, hand lines, etc.
- Pet food on the back porch has attracted skunks or other wildlife.
- You hear gunfire from legal shooting.
- Your cell phone does not work properly on your property.
- You cannot access Internet services from your property.
- The Wild and Scenic Rivers Act imposes restrictions on your property use.
- You share your drinking-water well with your neighbor.

**Each community in Deschutes County is unique and has its own rules and regulations**



# History

Preserving the natural resources of our land also means acknowledging those who came before us. Native Americans, including the Warm Springs, Wasco, and Paiute tribes, lived in this region or visited it to hunt, fish, gather foods, and trade. Deschutes County lies within the lands ceded to the United States in the Treaty with the Tribes of Middle Oregon in 1855.

Those who signed the 1855 Treaty moved onto the Warm Springs Reservation and are known as the Wasco and Warm Springs tribes. Paiute people began settling on the Warm Springs Reservation in 1879 and, along with the Wasco and Warm Springs tribes, now comprise the Confederated Tribes of the Warm Springs Reservation of Oregon. The Confederated Tribes of Warm Springs have legal rights to harvest and manage wildlife as well as have the right to suitable habitats to support wildlife populations.

The first Europeans to colonize the region were members of the American Fur Trading Company. The party searched the area for beaver, apparently in 1813. You can see a rock carved with initials by the leaders Reed and Seaton at the Deschutes County Historical Society.

Although Oregon gained statehood in 1859, it wasn't until around 1862 that Felix Scott Jr., Marion Scott, John Craig and Robert Millican brought 900 cattle to Central Oregon.

They were followed by sheep, cattle and potato farmers. In 1900, Alexander Drake settled along the Deschutes River and within five years had the support of 500 residents to incorporate the City of Bend. Sisters was founded in 1901, followed in 1904 by Laidlaw (now known as Tumalo).

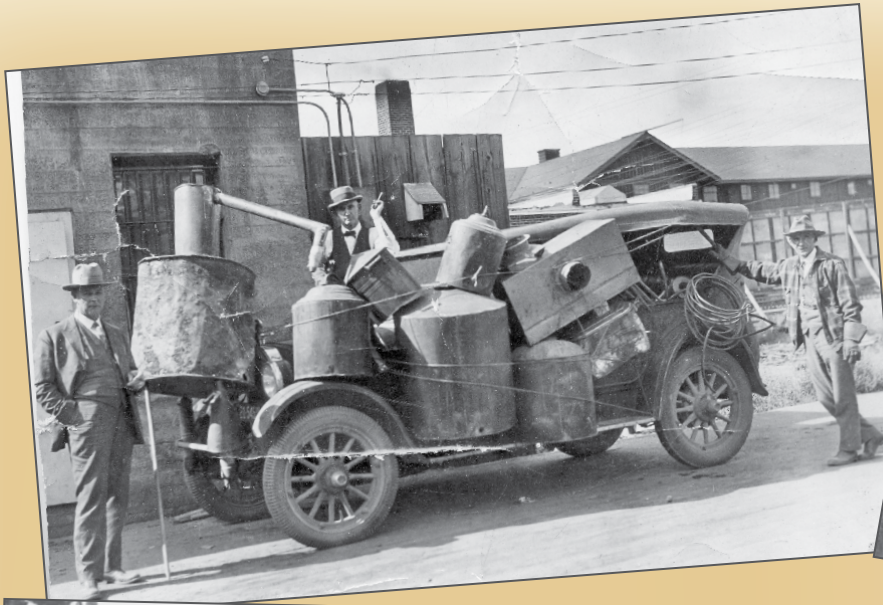
The Homestead Act of 1862 brought many farmers into the area. However, the Enlarged Homestead Act of 1909 lured hundreds of hopeful settlers who desperately attempted to tame the harsh, unforgiving high desert. By 1920 all but a few hardy individuals had abandoned their land claims, which the desert readily reclaimed. The railroad arrived in 1911 and was followed by the future towns of Terrebonne (then known as Hillman), Redmond, and La Pine.

Deschutes County was created in 1916 when residents overwhelmingly voted to break away from Crook County. The year before, two large companies (Shevlin-Hixon and Brooks-Scanlon) announced plans to build lumber mills just south of downtown Bend. The mills created many jobs that stimulated a large building boom and an increase in the local population. By 1920 the county had 9622 residents.



A homesteader moving to Central Oregon. "Bound for a homestead and bound to get there, Bend Ore." Four-horse team is pulling a bulging wagon filled with belongings, which in turn is pulling a buggy also filled with bedding and a large te to a tin. Two cows are tied to the buggy. Photograph courtesy of the Deschutes County Historical Society.

Learn more about the Confederate Tribes of the Warm Springs here.



Top left to right: Confiscated stills during prohibition, c. 1920. Mess of rainbow trout, creel, and fishing poles, photographed by Myron Symons of Symons Bros. Jewelry Store. Bottom left to right: Bend to Burns Fast Freight and Express auto stage, c. 1914. At Brookings Station near Hampton, travelers could stay the night, have a good meal and rest for the next days travel into Burns. Clyde McKay, an avid outdoorsman, came to the upper Deschutes county in 1900. He helped consolidate the timber holdings and played other key roles in the development of the city. Photographs courtesy of the Deschutes County Historical Society.

## The Deschutes County Fair premiered in 1919 and was known as the Potato Show.

Shevlin-Hixon sawed its last log in 1950. The county population had reached almost 22,000. Further growth began in 1960 when plans unfolded to convert the US Army's Camp Abbot into Sunriver. Bachelor Butte (Mt. Bachelor) lured skiers from abroad. Central Oregon Community College broke ground for its new campus on Aubrey Butte.

The beginning of the end of the logging era occurred in 1980 when Brooks-Scanlon sold its timber interests to Diamond International.

The county population had reached 50,000, and the main industry changed from logging to tourism.

Growth has increased as people throughout the country have discover the richness of the area. Deschutes County offers downhill and cross-country skiing, snowboarding, fishing, hunting, rock climbing, white water rafting, golfing, horseback riding, hiking, canoeing, touring, and a host of cultural and educational events. The population of the County is approaching 197,692 (2019).



# Living in Deschutes County

**T**he High Desert is a high, dry, grassy/shrubby area in eastern Oregon. Deschutes County is at the western end of the High Desert and consists of a wide plateau bounded by forested mountains on the west, juniper/sage to the east and ponderosa/lodgepole pine to the south. Elevation ranges from 2385 feet on the Deschutes River at the north end of the county to 10,240 feet at the top of South Sister and 3623 feet around Bend.

## Climate

Deschutes County is characterized by moderate days and cool nights. Typical summers are dry and hot; winters tend to be relatively dry and cold. Most precipitation falls in winter as snow. Temperatures and precipitation vary throughout the county due to changes in elevation and topography. Due to climate change, though, summers are becoming hotter and winters are milder, decreasing the annual precipitation.

## Wildfires

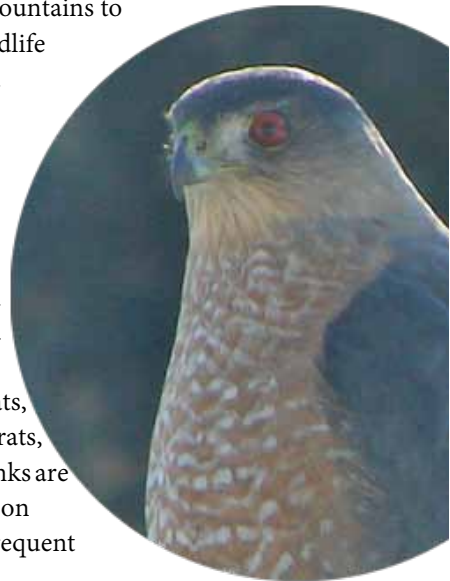
Away from homes and communities, fire is essential to the health of our forests and rangeland. Fire removes undergrowth that chokes trees and facilitates disease. Burned trees replenish nutrients to the soil. Standing burned snags and downed trees in streams create habitat for fish and wildlife. Many plants require fire as part of their life cycle.

City	Elevation <sup>2</sup>	Precip. <sup>3</sup>	Average Temperature <sup>1</sup>	
			Jan (max/min)	Jul (max/min)
Redmond	3077	8.8	42/23	86/46
Sisters	3200	14.0	41/21	84/42
Bend	3623	>12	41/24	82/47
Sunriver	4100	17.0	39/24	79/49
LaPine	4300	23.0	39/20	82/46
Brothers	4640	11.0	37/16	80/42

<sup>1</sup> Average temperature in degrees Fahrenheit.  
<sup>2</sup> Elevation in feet.  
<sup>3</sup> Average annual precipitation in inches.

## Wildlife

Deschutes County includes a wide variety of wildlife habitats, from forested alpine mountains to dry juniper/sage rangeland. Wildlife presence varies with habitat and season. Deer often winter in the lowlands and migrate to the mountains in the summer. Elk frequent higher elevations. Predators, such as coyote, bear, and cougar, can be found in the County. Marmots and ground squirrels live in the grasslands. Bushy-tailed wood rats, more commonly known as pack rats, can be a nuisance, while chipmunks are comic entertainers. Raptors soar on desert thermals, and songbirds frequent all habitats.



## Urbanization

Deschutes County is becoming more urban as our population continues to expand. Such growth will require maintaining adequate amounts of residential, commercial and industrial lands. Preserving open spaces, natural resources, rural land, and functional ecosystems that help define the qualities of Deschutes County will also be important for sustainable growth.

## Gardening

Gardening can be a challenge for people used to more moderate climates. While the United States Department of Agriculture designated Central Oregon as Hardiness Zone 5, some areas may be as low as Zone 3. Plus, there are various micro-zones.

For more information about gardening, inquire at local libraries, OSU Extension Service, and local nurseries.







# Natural Resource Concerns

## Water

As inevitable droughts continue to impact Deschutes County, maintaining water quality management plans and regulations will be vital to prevent and control water pollution from agricultural activities. We need to be more efficient with our irrigation water to ensure we have enough water to meet our agricultural, recreational, and wildlife needs.

## Soil

Most Deschutes County soils are derived from ancient volcanic activity, especially activity related to the formation of Crater Lake after Mt. Mazama erupted. Soils tend to be coarse, sandy and sterile and must be amended with organic material to improve moisture-holding capacity. Soil health is defined as the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans. This definition speaks to the importance of managing soils, so they are sustainable for future generations. To do this, we need to remember that soil contains living organisms that provide the basic necessities of life - food, shelter, and water - and perform functions required to produce food and fiber.

## Invasive Weeds

Invasive weeds are all around us, but knowing what they look like and how to prevent them can help reduce their impact on our community. They are capable of causing severe damage in areas outside their normal range, harming the economy, the environment, or human health once they become established.



[www.deschuteswcd.org](http://www.deschuteswcd.org)

## Fish and Wildlife Habitat

Deschutes County is home to several wildlife species. Some like the Western Sage Grouse, Spotted Frog and Bull Trout have impacts to private land owners, irrigation districts and other local entities. Finding solutions to meet the wildlife needs and landowner objectives are challenging yet obtainable.

## Forest Health

Southern Deschutes County contains a mosaic of dry forest types and aquatic/riparian systems such as ponderosa pine and lodgepole pine, as well as extensive riparian areas along the three main rivers (Deschutes River, Little Deschutes River, and Fall River). Most of the area is lodgepole pine that is overstocked and prone to insect and disease. These threats are a high risk to catastrophic fire which can threaten municipal infrastructures, impair the Upper Deschutes River water quality due to erosion and overall timber production.

## Canal Piping

In recent years, most Deschutes County irrigation districts have initiated canal piping projects. Canal piping reduces the amount of irrigation water lost through ground fissures and evapotranspiration. A percentage of the water saved by piping can be returned to the Deschutes River to assist with the river restoration goals of several organizations and government agencies. Irrigation districts sometimes receive partial funding from these organizations and agencies to assist with the piping projects in exchange for the water returned to the river.

## Piping Projects

Water has always been a challenge in Central Oregon. Those who came before us carved more than 700 miles of canals out of the dense volcanic rock using horses, shovels and primitive machinery. Today we face our own challenges of upgrading a century-old system to best serve the needs of all patrons for the next 100 years.

Current and future piping projects include the Pilot Butte Canal Piping Project, which will conserve 30 cubic feet per second (equivalent to 10,000 acre feet) while creating operating efficiencies for over 300 patrons and save an additional 30-40 cfs over time. Others include the Elder Lateral Piping Project, different phases of the Main Lateral Piping Project, and the Butte Lateral Piping Project.



# Agriculture

**D**eschutes County has a wide range of growing seasons because of elevation differences. Growing high-value crops can be risky at even some of the lower elevations. Frost can happen any time during the short growing season. Climate definitely limits crop production.

In the past, crops included wheat, barley, oat, rye, triticale, peppermint and potatoes, with minor plantings of sugar beets, chickpeas and garlic, vegetable and Kentucky bluegrass seed. Even strawberries were commercially grown in Central Oregon.

Hay and pasture are the main irrigated crops and are the foundation of the livestock industry, with 22,460 acres currently grown each year. Alfalfa, alfalfa/grass and different grass species are grown for hay. The hay is sold to dairies, feed stores and farms and ranches, locally and out of county, and exported, as well as fed on-farm and on-ranch.

Less than 1000 acres of wheat, vegetable seed and peppermint are grown in the northern part of the county, and some grape vineyards are being planted. There is also a thriving nursery industry, along with some turf production, a few community-supported agriculture farms and several lavender farms.

[www.deschutesswcd.org](http://www.deschutesswcd.org)

Livestock and other animals are a large portion of the agricultural industry. Cattle are the main animals raised, with around 13,895 beef and dairy cows. There are also 3,595 horses and ponies in the county as well as 7,467 layers. More people are raising dairy and meat goats, and artisan cheese makers have thriving businesses.

Through the years, the size of farms has become much smaller as more people move to the country to experience the farming lifestyle. The 2017 Agricultural Census shows that of the 1,484 farms in Deschutes County at least one acre in size, 597 farms were less than 10 acres, 671 were 10 to 49 acres, and only 12 were more than 1000 acres. The average farm size was 91 acres.





# Buying Rural Property

**L**iving in a rural area can be a satisfying experience. Whether you raise crops and livestock or just enjoy fresh air, open space and solitude, this chapter offers some tips to help first-time, rural-property buyers, or those new to Central Oregon, with their acquisition plans.

It is important to have reasonable expectations of rural living. If you have not lived in the country before, consider renting before investing in a piece of land.

## Land Values

Land values fluctuate based on local and national market conditions. The presence of irrigation water can greatly influence the value of land. Work with a real estate agent who specializes in rural properties. They should be familiar with land-use restrictions, be aware of water problems, and know where to get answers to your questions. It is in your best interest that the agent is the buyer's, not the seller's, agent. Many rural buyers find it helpful to hire an attorney, who is an expert on rural property sales, to represent them in the closing process. For more information on land values, contact the Central Oregon Association of Realtors.

## Emergency Services

Law enforcement and residential fire protection services are different in rural areas. The County Sheriff's Office provides rural law enforcement, and rural fire protection districts provide residential fire protection to properties within their district boundaries. Before buying, find out what services are provided at your property.

## Reliable Water

Unlike city property with water and sewage connections, you will need to know if there is a reliable water source for home use, livestock, water and farm irrigation. An existing well should be professionally tested for purity and adequate flow. If there is no well, you may make the sale of the property contingent on successfully drilling a well. It may be less expensive to pay for a dry well than to buy the property and find

out that there is inadequate water. It is also important to fully understand irrigation water rights that may apply to the property and the method of irrigation. For information concerning irrigation water rights, contact the Oregon Water Resources Department.

## Septic System

If there is a septic system, it should be professionally tested to assure that it works properly. If there is no septic system, percolation tests should be professionally done before you buy the property. This assures that a new septic system will be approved for installation. For more information, contact the Bend Community Development Department.

## Power

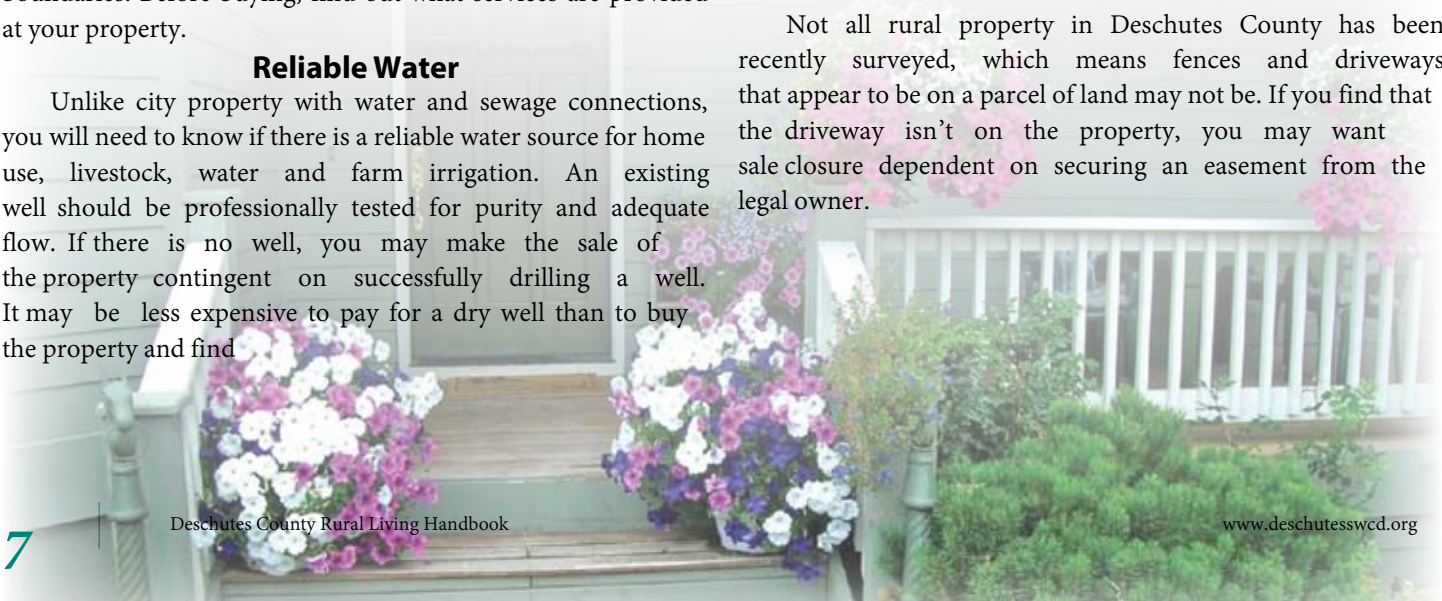
Power hook-ups can be expensive in rural areas. The ideal home site may require a costly power run. If you are on a tight budget, check the cost of hooking up to power prior to making an offer on the property. Also, remember to include the telephone lines. Some families have chosen to generate their own power.

## Easements and Access

Be sure to check and understand vehicular access and easements that pertain to the property.

## Utility and access easements may allow others some legal use of your property.

Not all rural property in Deschutes County has been recently surveyed, which means fences and driveways that appear to be on a parcel of land may not be. If you find that the driveway isn't on the property, you may want sale closure dependent on securing an easement from the legal owner.





# Land Use Requirements

**D**eschutes County has strict land-use laws. It is important to understand the land-use rules that apply to the parcel you are considering and to the properties in the vicinity.

Things can change: some properties can be sub-divided into smaller parcels and forests can be logged. Not all zones allow for a new house as a matter of right. If a property doesn't have a satisfactory home or is vacant, before purchasing, you will want assurances that you will be allowed to build a new one at the location you desire or remodel the old one. If you want to fill in a wetland on your property, remove trees in a stream channel or do similar activities, you may first need to obtain a permit from Oregon's Department of State Lands, which regulates the removal or filling of certain amounts of material in state waters.

## County Permits, Planning and Zoning

The Deschutes County Community Development Department (CDD) has available all county-issued development permits. The CDD facilitates orderly growth and development through coordinated programs of planning and zoning, environmental health and building safety. Obtain information, such as development history, zoning, current development regulations and procedures, maps of your property with overlay zoning, flood plain, soils, aerial views and other useful tools at CDD offices.

Research past development activities or the potential for development on-line or in the CDD office. Customized mapping products are available through their Geographic Information System (GIS). Complaints about perceived violations of county codes will be investigated upon written request. Counter staff are available to assist during regular business hours.

All proposed buildings on your property must be reviewed and approved by the CDD. Be sure to consult the CDD before starting a project, so that you obtain all necessary permits and your project is consistent with all applicable regulations.

The Planning Division processes individual land-use applications and establishes policies and regulations to reflect the community's vision for the future. The Planning Division maintains information on zoning, land-use regulations and historical land-use permits.

The Environmental Health Division oversees the installation of on-site sewage disposal systems for homes that are not served by a community or centralized sewer system. The Division also licenses and inspects restaurants, pools, spas and other facilities.

The Building Division reviews construction plans and inspects all new structures for conformance with applicable building, plumbing and electrical codes.

## Scenic Waterways

The setting and visual characteristics that draw people to rural property are the same values that created the Oregon Scenic Waterways Program. Land purchased along the Deschutes River could be within the boundaries of a state scenic waterway.

A major function of the program is to protect the natural and scenic diversity of waterways by encouraging new development to blend with existing development. This program tries to achieve a balance between protecting natural resources and granting the wishes of riverfront property owners. Existing uses in the form of residences, grazing, farming and forest crops are recognized as a part of the scenic beauty of the scenic waterway.

The Oregon Parks and Recreation Department (OPRD) reviews land use changes within state scenic waterways. You are required to notify the OPRD of certain improvements or changes in land use you may want to make. The proposed changes may not start sooner than one year after such notice, unless OPRD has given written approval.

OPRD rules and regulations: <https://www.oregon.gov/oprd/PRP/Pages/PRP-SSW-rules.aspx>

Setback regulations and allowed uses on a specific property: Deschutes County Community Development Department, [www.deschutes.org/cd](http://www.deschutes.org/cd)

Deschutes County CDD Planning Division: <https://www.deschutes.org/cd/webform/land-use-planning>





# Living Next to Agriculture

People move to the country for numerous reasons. It is important to become acquainted with daily and seasonal activities that go along with the joy of living next to agriculture. Many farmers depend on their land to make a living; it is important for non-farming neighbors to have a clear understanding of an agricultural-based lifestyle.

## Right-to-Farm

Agricultural operations are protected by Oregon’s right-to-farm law, a policy that seeks to protect the investment farmers have made in their agricultural operations. Neighbors in rural communities understand the following principles regarding agricultural lands:

- Farm operations may involve practices that result in noise, dust and odor.
- Agricultural operations are sometimes conducted outside of normal business hours. Cutting and baling machinery often operate at night, and agricultural equipment can be noisy.
- Pesticides are commonly used in raising crops and their use is strictly regulated by state and federal governments.
- Tillage operations can raise dust, and field burning creates smoke.
- Agricultural equipment has the right of way on public roads.

**Understanding Rural Living:  
Be a Good Neighbor**

Problems arise when people don’t understand what is happening and the reasons why. Avoid potential conflict by understanding some basic principles:

- **Communicate:** Get to know your neighbors and make an effort to understand more about their operation. With communication, many problems can be avoided. Don’t assume anything.
- **Respect Private Property:** Ask permission before entering private property. If you are granted permission to travel down private roads, be sure to leave gates as they are found (closed or opened). Pay attention to “No Trespassing/Private Drive” signs.
- **Privacy:** Realize that while people who live in rural areas often value their privacy, they also depend on their neighbors for help, advice and, perhaps, a cup of sugar to finish their batch of cookies. Respect one another’s privacy, but don’t be afraid to extend some friendliness and courtesy.



## Fences

Fences and property lines are often a source of conflict between neighbors. Remember that fences do not always indicate property lines. Before purchasing your land, locate your property lines and confirm whether the existing fences are properly placed. Be sure to discuss any concerns with your neighbors and learn of past agreements. Decide if you can abide by the same agreements. Fence lines are often shared between two neighbors and, in most cases, each landowner shares half the expense and labor to maintain or install a fence. Work with your neighbors to improve cooperation and build strong relationships.

People are often unaware of private-property boundaries. Fences often imply private property; however, private property is not required to be fenced. It is the responsibility of individuals to know whose land they are on, regardless of whether it is fenced. Always ask permission to be on someone's property.

## Gates

Properly maintained fences are important for the protection of livestock and wildlife. Fences allow for good pasture-rotation planning in managing livestock.

**When passing through another's gate, remember it is imperative that you leave the gate as you found it. If the gate was open, leave it open. If it was shut, close it after you pass through.**

## Dogs

Keep your dogs under control and on your property. Free-roaming dogs can be a threat to the public, livestock and wildlife. Livestock owners have the right to protect their livestock and in some cases will hurt dogs that threaten their herds. If your pet kills or injures livestock, you can be held financially responsible and your dog may be euthanized.

Pets should have collars and identification tags. Deschutes County requires a dog to be licensed if the animal is six months old or has its permanent canine teeth, whichever comes first. License forms are available at the Deschutes County Finance Department, veterinary offices and the Redmond and Central Oregon animal shelters. Spayed or neutered animals qualify for reduced fees.

**Be a responsible pet owner. Always spay or neuter your dogs and cats.**

## Simple Hints for Getting Along With Your Neighbors

- Respect your neighbor's endeavors and recognize that being a good neighbor is a two-way street.
- Understand that some practices, such as burning along irrigation ditches, are common farming practices and necessary at certain times of the year.
- Farmers often work around the clock, especially during planting and harvesting seasons. The noise of equipment may temporarily disrupt the peace and quiet. Enjoy the sound of agriculture in action.
- Coordinate use of irrigation water on shared systems. Be aware of irrigation policies associated with your property.
- Proper pasture and irrigation management prevent pastures from turning into dusty, weedy fields. Do not over graze pastures; use water efficiently and wisely.
- Control weeds on your land. Good management practices will keep weeds from spreading to your neighbor's property through water systems, wind and other means.
- Alert neighbors if their livestock is on your property.
- Deschutes County has Open Range and Livestock Districts. If you are in an Open Range area and don't want other people's livestock on your property, you must build adequate fences or have natural barriers to keep livestock out. If you are in a Livestock District, the animal owner is required to keep the animals confined to their property.
- Be a courteous driver. Farm equipment often uses public roads to travel from field to field. Slow down, be patient and move over to make room for this equipment.





# Fire Prevention

**E**ach year more people move into previously uninhabited forested rural areas, where dry, hot summers increase the danger of wildfire. These remote areas have just as high a risk of structural fires as urban areas, yet longer response times, limited water sources, difficult terrain, and unpaved roads all increase the risk of losing a home to fire.

A defensible area is 30 to 200 feet around a home where firefighters can safely make a stand to protect the house during a fire. If a home and landscape are properly maintained, the home is likely to survive a fire even without fire department intervention. The exact size of a defensible area depends on the slope of the land and the type of vegetation around the home.

## Simple Fire Prevention Measures

- Maintain 30 feet of fire-resistant plants around a home. Mow grass to less than four inches if you have a grass lawn.
- Prune the lower branches of trees below eight feet to remove ladder fuels.
- Protect large trees by removing fuels (shrubs and woody debris) under them.
- Trim branches away from the roof and house. Keep gutters clean of debris.
- Trim branches along driveway at least 14 feet tall and wide so emergency vehicles can access the property.
- Replace wood shake roofs. Screen vents and areas under short decks with metal mesh one-quarter inch or smaller. Consult a fire specialist if the deck is over three feet high.
- Store firewood at least 20 feet away from a house during fire season.
- Keep water and firefighting tools available and ready.
- Maintain good access to a home and ensure that the address is visible and easy to read. Clearly post the address at each rural intersection or road fork with an arrow under the address.
- Make sure the driveway can accommodate a fire truck and has a large turn-around space.

## Fuel Breaks

A fuel break around a home and along a driveway can be one of the most effective ways to protect property. A fuel break is an area where the fuel or vegetation has been reduced to change the fire behavior, which will reduce the fire intensity and spread. Creating a fuel break can be a major undertaking. Start small and do a little bit over time. Once completed, annual maintenance is much less demanding. Protecting the home is the primary concern, so start with the home and work outward. Because fire burns 16 times faster uphill, start on the down hill side of the home. Firebreaks do not have to sacrifice the scenic beauty or natural setting and wildlife habitat of property.

## Fire Season Preparation

During fire season, public and industrial operators are required to follow Oregon fire-prevention laws. Fire season typically begins in mid-June and sometimes as early as mid-May. The end of fire season is more variable, usually ending in mid-October, although it has ended in mid-September to early November. It takes only about one hour of direct sunlight for light fuels, such as grass, to dry out enough to cause an escaped fire.

All open burning is prohibited during fire season. Burn barrels are permitted in some jurisdictions. A permit from the local fire department or the Oregon Department of Forestry is required to burn in a burn barrel. Industrial operators must obtain a permit to operate power machinery and have fire tools, extinguishers and water supplies on site during fire season. A public Regulated Use Closure prohibits or regulates times that the public can perform various activities on forest land. These activities can include off-road vehicle use, campfires, smoking, dry-grass mowing and use of chain saws, fireworks and welding. These regulations are subject to change.

## Burning on Private Property

Burning on private lands within the Oregon Department of Forestry Protection District requires a permit and is restricted during certain times of the year due to wildfire threat. Fire laws that pertain to burning include household debris, forest operation debris and logging slash. After obtaining a permit, call Central Oregon Interagency Dispatch Center on the day you plan to burn for air-quality information specific to that day and location before lighting a fire.

## Fire Prevention Agencies and Their Responsibilities

The Oregon Department of Forestry is responsible for wildland fire protection and suppression on all state and private forest and range lands inside of their protection district boundaries. These responsibilities include regulating outdoor burning and industrial operation on forest lands and providing assistance to landowners by inspecting and offering advice for reducing risk on fire-prone rural properties.

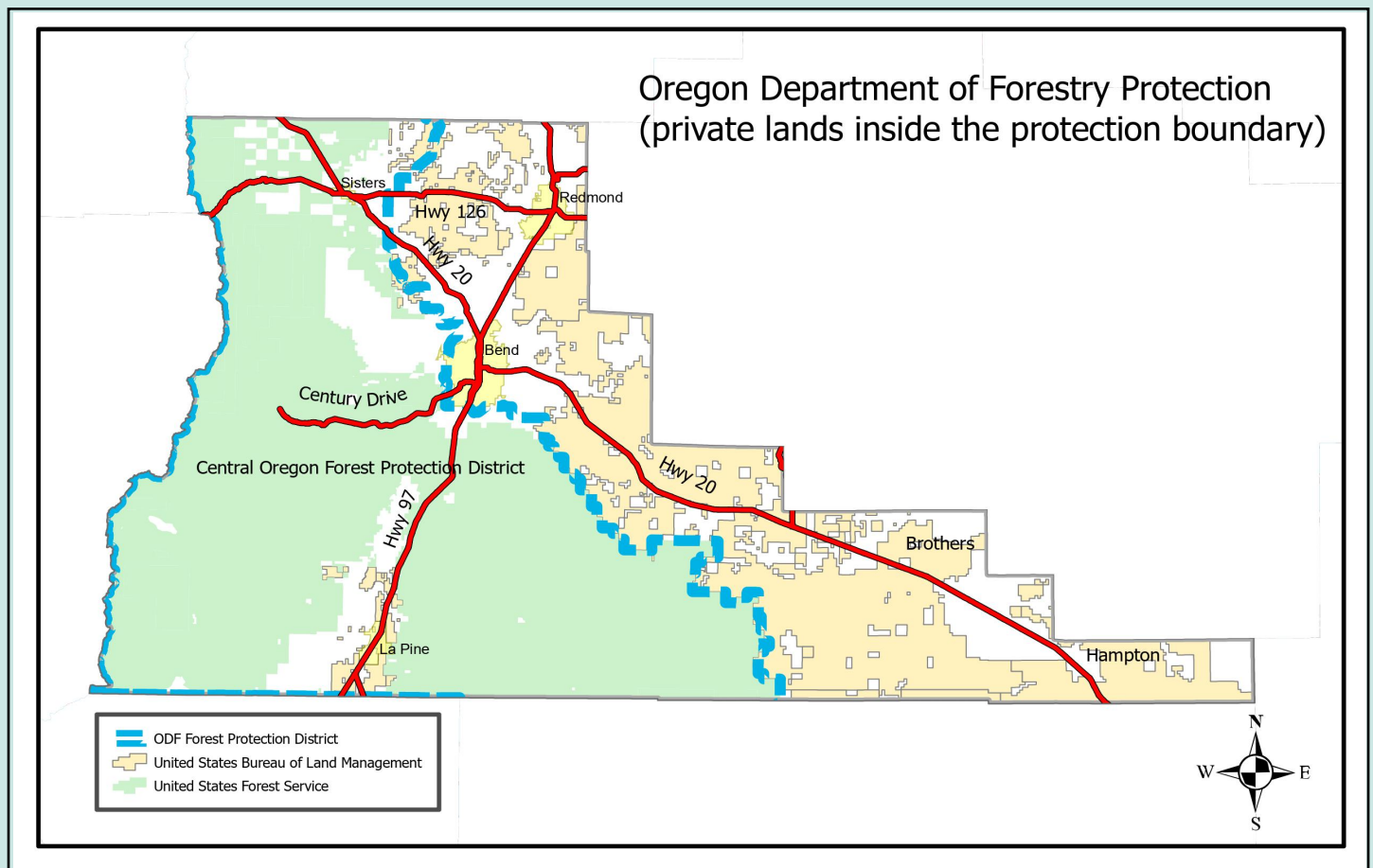
The Deschutes National Forest is responsible for fire protection on National Forest lands. National forest personnel cooperate with other agencies to suppress fires.

Rural and city fire departments provide fire protection within their respective districts or city boundaries. Departments will respond to wildland and structural fires inside their jurisdictions. Their primary responsibility is the protection of lives and improved property. They will assist other agencies.



PHOTO: Gene McMullin

Information about fire prevention: [www.firefree.org](http://www.firefree.org), [www.projectwildfire.org](http://www.projectwildfire.org) and [www.oregon.gov/odf/pages/index.aspx](http://www.oregon.gov/odf/pages/index.aspx)







# Home Gardening & Small Farms

Welcome to gardening in Central Oregon where weather is anything but predictable. Gardening and small farm production in the high desert is challenging because of variations in temperature, microclimate, soil type and precipitation.

By recognizing and dealing with these challenges, Deschutes County residents can successfully grow beautiful vegetables and flowers to personally enjoy or direct market to others through local farmers markets and community supported agriculture (CSA) operations where subscribers buy shares of a farmer's harvest.

## Understanding Challenges of the Central Oregon Environment

### Temperature and Elevation

Central Oregon is known for its many sunny days. However, the Central Oregon climate has a wide range of temperature extremes between night and day, and because of these fluctuations, plants often bud out prematurely. High elevations also affect temperature and duration of the growing season.

Because of the high elevation, frost can occur at anytime of year.

There are many microclimates in Deschutes County. A microclimate is defined as the climate of a small area, such as your backyard or a portion of your backyard, as opposed to that of a larger region. Some factors that influence a microclimate include cold pockets, hills and the location of houses or other structures. Microclimates can influence plant adaptability and should be considered when selecting plant material.

### Soils

Soil types vary in Central Oregon. Depending on location, soil may be sandy, rocky, clay, silt and/or loam. The soil tends to be very sterile and lacks organic matter. It is important to amend the soil with organic material, such as compost or aged manure, to improve water-holding capacity, increase soil microorganism activity level and improve the overall health of the soil.

The soil pH is usually around 7.0, which is neutral and suitable for most plants. In some areas it may be a bit more alkaline (pH above 7.0) and require soil amendments to reduce the pH. Most vegetables prefer slightly acidic pH in a range of 6.0 to 7.0, while other plants, such as azaleas, blueberries and rhododendrons, require a soil pH below 6.0, preferably 4.5 to 5.5. It is important to know what type of soil you have. A soil test helps determine soil pH and provides a nutrient analysis of your soil. Contact the local OSU Extension Service office to learn how to take a soil sample and where to send it for testing.

## Improve Opportunities for Success

### Site selection

The location you choose should receive full sun and be protected from wind. A south or southeast-facing slope will warm earlier in the year and allow cool air (which is heavier than warm air) to flow down and away from the garden.

### Soil preparation

Sandy soil that drains well will warm faster in the spring and remain warmer through the growing season. However, it is important to add organic material to sandy soil to improve its nutrient value and water-holding capability. Adding organic matter to clay soil also allows it to drain better and warm up quicker. To get a start on the season, cover soil with clear polyethylene plastic film to help warm the soil so you can plant sooner.

Consider building raised beds, 8 to 12 inches high. Soil tends to warm faster in raised beds. Raised beds also help with better drainage of heavier soils.

### Plant selection

Although frost may occur at any time, the average growing season in Deschutes County typically ranges from 60 to 90 days, with the shorter seasons occurring in higher elevations. Consider the growing season when selecting seeds or plant varieties for your garden as there may be limits to growing warm-season vegetables (melons, corn, eggplants). Root crops (potatoes, carrots, beets), short-season vegetables and cold-

tolerant crops (cabbage, chard, leaf lettuce) do best in high elevations.

### Water

Natural precipitation ranges from 8 to 22 inches per year, most of which falls during the winter season as snow, so it is essential to have an irrigation system in place (e.g. hand watering, sprinklers, drip). Soil conditions and temperature will determine when and how much water is needed. It is important to apply the proper amount of water to plants to keep them healthy and productive. Three common watering problems to avoid include: over watering, postponing irrigation until plants are stressed and frequent, shallow watering that results in poor root development of plants.

### Financial and Technical Resources

The Natural Resources Conservation Service (NRCS) offers technical and financial assistance for various projects. The Environmental Quality Initiative Program (EQIP), for example, provides assistance to agricultural and forestry producers in order to address natural resource concerns and deliver environmental benefits. As well, The Farm Service Agency (FSA) offers loans to help farmers and ranchers get the financing they need to start, expand, or maintain a family farm. For more information, go to their websites.

NRCS resources: <https://www.nrcs.usda.gov/wps/portal/nrcs/main/or/programs/financial/>

FSA Loans: <https://www.fsa.usda.gov/programs-and-services/farm-loan-programs/index>

### Tips for Cold-Climate Gardening

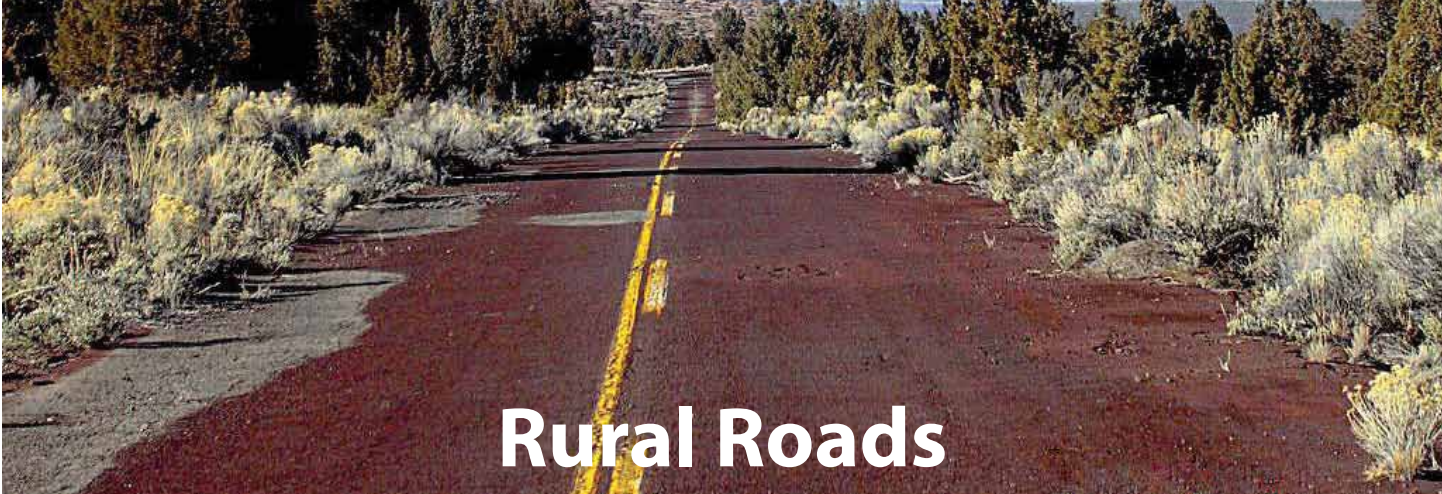
For more tips to extend the growing season, contact the local Oregon State University Extension Service office.

- Use season extenders, such as row covers (to prevent frost damage), walls-of-water (for tomatoes), cold frames and greenhouses.
- Be sure to water perennials, trees and shrubs during periods of drought in the winter if the ground is warm enough to accept water. Every six to eight weeks, give plants a deep soak to prevent winter desiccation.
- Mulch around perennials to insulate them for the winter.
- Select adaptable plants and be sure to put the right plant in the right place. Consider mature size, light and water requirements of the plants you select.
- Protect plants from wind by planting a windbreak or planting on the east side of the home.
- Add 14 days to the number of days given for maturation on the seed packets for direct-seed vegetables and flowers due to cool evening temperatures.



NRCS Address: 9580, 625 SE Salmon Ave #4, Redmond, OR 97756  
Phone Number: (541)699-3206

FSA Address: 625 SE Salmon Ave #4, Redmond, OR 97756  
Phone Number: (541)923-4358



# Rural Roads

**R**oad maintenance is determined by jurisdiction; a road could be a state highway, county road, local access road or private road. State highways and County roads are maintained by their respective administrators: Oregon Department of Transportation (ODOT) and the Deschutes County Road Department.

## Access

Local access roads are prevalent in Deschutes County. These roads were built with no standards and were never established as county roads. Deschutes County has jurisdiction for these right-of-ways per ORS 368.031, but any maintenance they receive is by and at the expense of the residents benefiting from the road. In some cases, residents have formed a special road district or neighborhood association that collects a tax or fee for road maintenance. Contact the Deschutes County Road department to find out who has jurisdiction of the road in front of your property. School buses generally travel only on maintained roads. You may need to drive your children to a bus route so they can get to school. Roads within a destination resort are private and under the jurisdiction of that resort.

## Road Surface Maintenance

Deschutes County does not have a list of roads to be paved. If the road in question is not paved, assume it will not be paved in the future. Chip seals are the primary method to maintain surfaces. This process places a sealing layer of asphalt over the existing pavement, and an aggregate chip is embedded into that asphalt to protect the seal. This process is repeated every seven to nine years. Crack seals, pothole patching and fog seals are also used as conditions warrant. Roads are usually swept only once (in the spring) to remove winter sanding materials.

## Right-of-Way

Most of the roads in Deschutes County have a 60-foot right-of-way, with the road being reasonably close to the center. Utility companies also have the right to use this right-of-way for transmission lines, on poles or underground. It is in the best interest of the public to keep the right-of-way clear of obstructions, including trees and vegetation. On County-maintained roads, planting and irrigating are prohibited

on the right-of-way. Sprinklers must be shielded to prevent water from reaching the roadway shoulder.

## Driveway

A driveway or access permit is required before any work can be done on adjoining property. The Road Department will inspect the proposed location of a driveway for safe sight distance, angles, grade and whether a culvert will be required. Driveways that do not meet County standards for sight distance at the driveway are not permitted. Before constructing a roadway to your front porch, make sure you know exactly where your property lines are. It's important to take all precautionary measures to avoid trespass, unauthorized use or possible changes to the course of water flow.

## Snow Removal

Deschutes County crews begin plowing snow when there is, or expected to be, a four-inch accumulation. Traction aids, such as sanding and de-icing materials, are used sparingly on higher-volume roads. Arterial and collector roads receive the first priority, followed by local residential streets. During long snow events, it may take more than a day before a plow gets to local streets. Rural residents should always be prepared for limited or no access during storms regardless of the season.

## Dust

If you live on an unpaved road, there will be dust. Deschutes County controls dust on county-maintained roads for its benefit, not for the benefit of residents. Controlling dust from blowing off a gravel road reduces the loss of fine material, therefore reducing replacement costs and the frequency of grading.

## Open Range

Portions of Deschutes County are designated as Open Range. Livestock are legally permitted to run at large. Most open-range areas are NOT MARKED; state highways occasionally erect Open Range signs. Even if fences are present, livestock may still be on the roadway. If an animal is hit, the animal's owner is NOT at fault.



# Managing Your Land

**T**here is a lot to know about owning and managing land, and you'll need to know even more if you're raising livestock. With a little time, some knowledge and a modest amount of investment, you can have a place in the country of which you can be proud, while protecting Deschutes County's natural resources.

So, you've just bought some property and are feeling overwhelmed? What are those weedy-looking plants? How can you improve the pasture? What do you do with that pipe lying around? How do you keep the deer out of your garden? Where do you start? Who can help?

## Management Plans

A Management Plan is the first step to successful land and natural resource management. It is easy to design a plan. Start by spending time on the property, looking around, making a sketch and taking notes on property boundaries,

neighboring structures, fences and corrals, buildings, wells, septic system, creeks, canals, bare ground, roads and driveways, soil type, weeds, pasture and cropland, trees, land uses and topography. Next, decide what you want from your property. Visualize how the land will be used, and how it should look. Be aware of how the plan fits in with other land uses in the neighborhood.

## Where to Go for Help

Many resources can, without charge, help you develop a management plan or just answer your questions. Some of these agencies also offer financial assistance for conservation projects in which you and the agencies share the costs (cost-share). (See Resource Directory for more information.)



**OSU Extension Service** provides research-based information in the areas of livestock, crops, horticulture, irrigation, hay, pasture management, soil fertility and small farms and acreages, as well as forestry, range and natural resources, home garden and landscape, family and community development, nutrition education and 4-H youth development. <http://extension.oregonstate.edu/deschutes/>



## Deschutes Soil and Water Conservation

**District (SWCD)** staff can help you develop forestry, range, farm, wildlife and wetland management plans. They can also help you acquire grants and financial aid for improvements. <http://www.deschuteswcd.org>



**Natural Resources Conservation Service** is a federal agency that helps landowners with soil and water conservation projects. For landowners who want to participate in federal cost-share programs, staff provide technical advice on irrigation, pasture management, riparian restoration, wetland management and other conservation practices. <http://www.or.nrcs.usda.gov/>



**Oregon Department of Fish & Wildlife** biologists can help enhance fish and wildlife habitat on your property. They also advise you on dealing with wildlife pests. Their cost-share programs can benefit you and the wildlife habitat you want to enhance. <http://dfw.state.or.us>



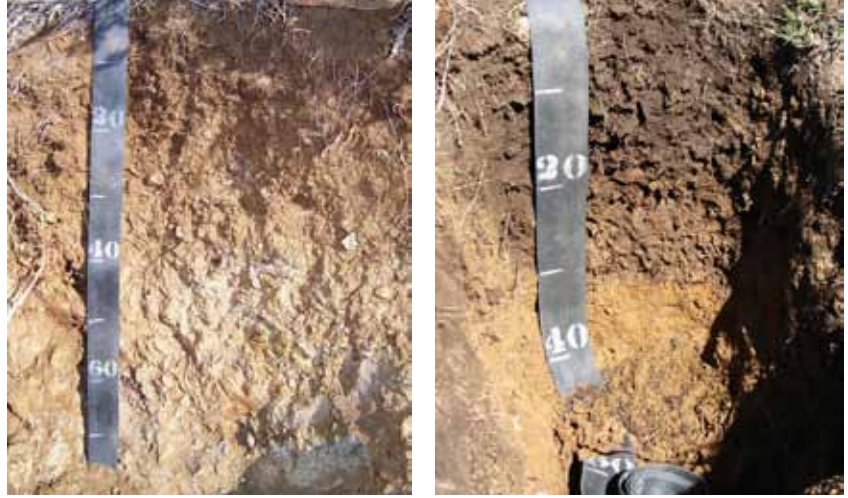
**Oregon Department of Forestry Stewardship Foresters** provide on-the-ground assistance to forest landowners. They also oversee cost-share dollars for forestry projects on private land. Invite a Stewardship Forester out to your property for a walk-through. <http://oregon.gov/ODF/>



**Oregon Department of Agriculture** oversees food safety, protection of natural resources and marketing of agricultural products. Staff implement the Agricultural Water Quality Management program, issue permits and help producers comply with confined animal feeding requirements. <http://oregon.gov/ODA/>

**Deschutes County** staff can assist you with many aspects of your property, including weeds, trees, fire prevention, zoning, easements and land use overlays. <http://www.deschutes.org>

# Soils



**D**eschutes County contains extreme variations in geology, climate and vegetation, and as a result, the soils throughout the county are diverse. Testing of soils is essential. When working with the soil on your property, a soil test is used for determining fertility and better understanding soil properties.

## Deschutes County Soil Basics

Geology plays a large role in determining soil properties. In Deschutes County, geology includes basalt bedrock, pumice rock, volcanic ash, glacial deposits and materials deposited by water. The majority of soils occur over basalt bedrock with a mantle of sandy pumice volcanic ash. Due to the volcanic ash, the local soils tend to be fragile and are susceptible to wind and water erosion when not adequately protected.

Soils are composed of clay, silt and sand. The combination of these materials determines the texture of your soil. For example, a soil with equal amounts of clay, silt and sand has a loamy texture. Sandy textures can't hold much water, and clay textures slow down water movement through soil. If irrigating, it is important to know your soil texture.

Textures of the soils on your property and hundreds of other soil properties and land use interpretations are available to the public in a document called *Soil Survey*. Using the soil survey is essential in managing your land.

## Soil Survey

A soil survey exists for almost all privately owned land in Deschutes County. Soil surveys are available from Web Soil Survey (<http://websoilsurvey.nrcs.usda.gov>). If you have questions about using the website or the information, contact the Natural Resources Conservation Service.

**Consulting your soils survey is a great place to start when you want to know the general properties of the soils comprising your land.**

## Soil Testing

Soil testing is a good way to determine the nutrient level of your soils, as well as their acidity and alkalinity. Common nutrient deficiencies in our area include nitrogen (N), phosphorus (P), potassium (K) and sulfur (S). The OSU Extension Service office can provide a list of soil-testing labs. When results are returned, Extension Service staff can help you interpret the results. Several agricultural supply stores in Central Oregon can also help you get soil samples processed and will explain results to you.

## Soil Saving Tips

Healthy top soil is essential for optimum crop productivity.

- Keep all soils on your property well covered with vegetation. Annual or perennial cover crops, sod-forming grasses, bunch grasses, native plants and ground covers are excellent soil protectors. OSU Extension Service Master Gardeners and agents can help in selecting native plants suited to your property.
- Reseed immediately with certified, NRCS grass seed after any earth-disturbing activity. Local seed companies have developed grass seed mixes appropriate for Deschutes County.
- Grade and reshape roads and building sites to direct water to safe outlets and prevent standing water on soils.
- Select crops that hold soil in place and enhance a crop rotation.
- Seeding early may reduce the risk of erosion.
- Create and maintain sediment basins and vegetative buffers along waterways.
- Control weeds.



Soils information and maps are free and available from the NRCS and the Deschutes SWCD or online at <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>.



# Water Rights

**U**nder Oregon law, the public owns most of the water. With some exceptions, a water right is necessary for anyone to use the public's water whether it be from a stream, lake, reservoir or even a well. This water right permit is obtained from the Oregon Water Resources Department (OWRD). Generally speaking, landowners with water flowing past, through or under their property do not automatically have the right to use that water without a permit from OWRD.

Oregon's water laws are based on the principle of prior appropriation. This means the first person to obtain a water right on a stream is the last to be shut off in times of low stream flows. In water-short times, the water right holder with the oldest date of priority (senior user) can demand the water they are entitled regardless of the needs of junior users. The prior appropriation doctrine is the basis of water law for most of the states west of the Mississippi River. East of the Mississippi, a different principle usually applies.

In the Deschutes Basin and particularly around Bend, Redmond, Prineville, Madras and Sisters, most of the irrigation water diverted and used is conveyed by irrigation districts. The landowner may have a water right attached to their land, but the irrigation district is the quasi-governmental entity that is paid by the landowner to deliver water to each specified, particular location within that irrigation district. The water right is attached to the land and as such is considered a property right.

Irrigation districts are also regulated based on the priority date of the water rights delivered through the district, the district can be shut off just like other water rights in times of shortages. The water master in Bend regulates among all water-right holders in Deschutes County and can do research for water rights on your property.

## Ground Water Mitigation

New groundwater rights for irrigation or other nonexempt uses have a mitigation requirement. Simply stated, the new use

[www.deschuteswcd.org](http://www.deschuteswcd.org)

must mitigate any potential impacts to surface water in the zone potentially impacted by the new groundwater right. This can be done in a variety of ways: purchasing mitigation credits, canceling an existing groundwater right or transferring a surface right in stream and creating a mitigation credit. For information on this requirement, contact the Oregon Water Resources Department, the local water master, or the Deschutes River Conservancy.



Oregon Water Resources: [www.oregon.gov/OWRD](http://www.oregon.gov/OWRD)

Deschutes River Conservancy: [www.deschutesriver.org](http://www.deschutesriver.org)

## Fundamental Principles

- Beneficial use without waste – Use for what the right was intended without waste.
- Priority Date – The date a water right was established.
- Appurtenance – Generally, a water right is attached to the land described in the right, as long as the water is used. If the land is sold, the water right goes with the land to the new owner.
- Must Be Used – Once established, a water right must be used beneficially at least once every five years. With some exceptions established in law (ORS 540.610), after five consecutive years of non-use, the right is considered forfeited and is subject to cancellation.
- Season of Use – The time of year during which water tied to a water right is legally allowed to be used.

## Groundwater Exempt Uses (uses without the need of a water right)

- Stock watering
- Not more than one-half acre of non-commercial garden or lawn
- Single or group domestic purposes not exceeding 15,000 gallons per day
- Single industrial or commercial purposes not exceeding 5000 gallons per day
- Down-hole heat exchange uses
- Firefighting



# Irrigation Districts

Some of the early Central Oregon settlers arriving in the Deschutes Basin first attempted dry-farming methods. Many of those efforts resulted in failure, and a few were successful. The first known attempts at irrigation in the Basin date back to 1871 when individual farmers diverted water from Squaw Creek, a tributary of the Deschutes River. In 1883, the first ditch was dug to divert water from Tumalo Creek for farming. Early advocates of western settlement recognized that settlement would require large-scale irrigation projects created with the help of the federal government.

During the late 1800s, the United States Congress passed several laws (Acts) to promote settlement of the arid western United States. At that time, most of the land was owned by the U.S. Government. Thirteen western states were included in this settlement project and entered into contracts with the Secretary of the Interior Department of the United States. These land grant contracts were conditional upon development and irrigation companies building canals and infrastructure that would deliver water to designated settlement areas and irrigate and sustain agricultural enterprises. In 1899, Oregon officially adopted this program and in 1901 contracted with irrigation companies to construct canal systems and to operate under specific rights and responsibilities. The construction of these canal systems allowed for farming to become a reality and changed the economy of Central Oregon.

## Three Sisters Irrigation District

The Squaw Creek Irrigation Company (now Three Sisters Irrigation District) was formed in 1895. Three Sisters Irrigation District diverts water from Whychus Creek (formerly Squaw Creek) and provides irrigation water to approximately 7,600 acres of land in Deschutes and Jefferson Counties. [www.tsidweb.org/](http://www.tsidweb.org/)

## Tumalo Irrigation District

Tumalo Irrigation District is a result of a series of development corporations filing claims to water flows from Tumalo Creek for irrigation beginning in 1891. Many miles of the Tumalo canal system were constructed between 1903 and 1904. Tumalo Irrigation District delivers irrigation water to approximately 7,400 acres of land.

[www.tumalo.org/](http://www.tumalo.org/)

## Swalley Irrigation District

The Deschutes Reclamation and Irrigation Company was established in 1899. In 1994, the shareholders of the Company incorporated and adopted the name of Swalley Irrigation District. Swalley delivers irrigation water to approximately 4,333 acres. [www.swalley.com/](http://www.swalley.com/)

## Central Oregon Irrigation District

Central Oregon Irrigation District had its origins in 1900 with the formation of the Pilot Butte Development Company organized by Alexander M. Drake. Drake later sold to the Deschutes Irrigation and Power Company. The Central Oregon Irrigation Company was created in 1910 when the Deschutes Irrigation and Power Company foreclosed. In 1917, the Central Oregon Irrigation Company reformed as the Central Oregon Irrigation District (COID), and, in 1918, COID became incorporated. COID has two diversions off the Deschutes River and serves approximately 45,000 acres in Deschutes County, Crook County and the southern edge of Jefferson County. COID also manages the Crane Prairie Dam, an irrigation water-storage facility owned by the Bureau of Reclamation. This facility also serves Arnold Irrigation District and the Crook County Development District #1. [www.coid.org/](http://www.coid.org/)

## Arnold Irrigation District

Arnold Irrigation Co. was organized in 1905. By 1920, Arnold had consolidated with three small irrigation companies: Pine Forest Ditch Company, Bend Company and North Irrigation Company. Since 1936, the group has been organized as the Arnold Irrigation District. Arnold diverts water from the Deschutes River and provides water to approximately 4,384 acres. [www.arnoldirrigationdistrict.com/](http://www.arnoldirrigationdistrict.com/)

## Irrigation District Responsibilities

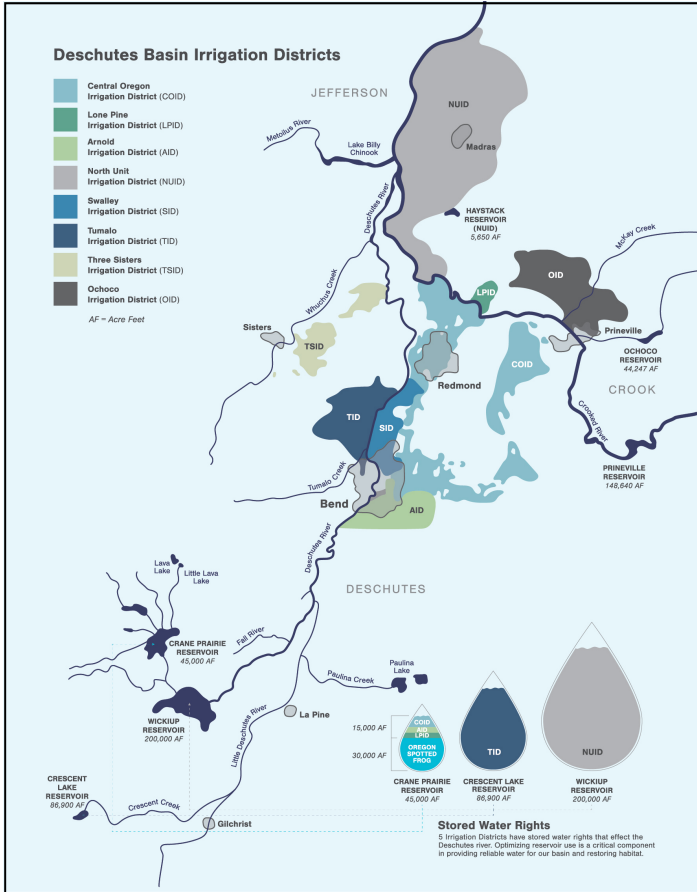
Each irrigation district is charged by the State of Oregon Water Resources Department with the responsibility of delivering irrigation water and facilitating the proper use of water rights within their jurisdiction. This means that irrigation districts administer, distribute, deliver and monitor the proper (beneficial) use of irrigation water under the terms of the water rights which are appurtenant to the lands served by their canal delivery systems. If your property is adjacent to a canal or ditch, that water is not available for use unless there is an irrigation water right for your property.

## Environmental Impacts

Since the formation of irrigation districts a century ago, environmental values, sciences and laws have developed and changed significantly. Seven Central Oregon irrigation districts have formed a coalition called the Deschutes Basin Board of Control (DBBC) to allow the districts to work together as a unit in implementing water conservation projects, providing educational resources, utilizing equipment and for other joint purposes. The DBBC, working with the City of Prineville, are developing a Habitat Conservation Plan (HCP) to address the endangered fish reintroduction regulations that may affect irrigation district and municipality water uses. The goal of the HCP is to provide the means by which these partners can adapt to environmental changes and to continue to meet the needs of their patrons and customers.

## Easements

Be aware that irrigation district easements exist for the operations and maintenance of the irrigation district's system. District easements often cross private properties. The canals exist for agricultural and industrial purposes and are not open to the public for recreational and other uses.







# Irrigation Water Management

**I**rrigation management involves the beneficial use of water to grow your crop optimally. Whether you are irrigating 1 acre or 1,000 acres, the principles are the same. Knowing the depth and texture of the soil and water application rate will help the grower to optimize irrigation water application based on the constraints of their irrigation system. Natural Resource Conservation Service soil survey maps contribute information for this purpose. Different crops have different seasonal crop water use requirements. Depending upon the crop, generally there is less water use by the crop in the spring and fall, with heavier water usage by the plants in the summer. Water used depends on the weather and growth stage of the specific crop.

Proper application of water on the land is accomplished by running one or more of a number of systems (hand line, wheel line, linear, pod, big or small guns and large or mini-pivots, etc.) or by flood irrigating (wild flood, gated pipe, corrugates, etc.). The goal is to apply the right amount of water to fill up the soil profile to the effective rooting depth of the plants, so they can utilize the water for growth as efficiently and economically as possible.

Evapotranspiration is defined as the evaporation of water from the soil and plant, as well as transpiration from the plant. Once the plant reaches its allowable depletion, then it is time to irrigate, allowing optimal growth.

Think of it as managing a check book. You can spend so much, but also have to leave a minimum in the account, or there is a penalty for withdrawing more. You need to keep your account within a certain dollar range. It is the same for irrigation scheduling; in this case, there is a penalty to the crop that is growing.

If you over apply irrigation water, pumping extra water costs the land owner extra money on their energy bill, and water will be wasted.

A century ago, when the irrigation canal systems were first constructed, water was delivered to the high point of the property to be flood-irrigated. This location continues to be called the “point of delivery.” An irrigation district’s delivery responsibility ends at this location. From this high point, the land owner flood-irrigated his land, as this was the only option available at that time.

## Flood Irrigation

Flood irrigation is an irrigation technique where a field is essentially flooded with water, which is allowed to soak into the soil to irrigate the plants. In general, surface irrigation stores large volumes of water in the soil and uses water less efficiently than sprinklers or drip irrigation. In Central Oregon, flood irrigation is about 30 – 45% efficient, depending on how much time the landowner spends controlling the water flow and the soil type and depth.

### Irrigation water management techniques may include these activities:

- Scheduling irrigation based on crop needs, soil type and depth, climate, topography and infiltration rates
- Improving irrigation efficiency
- Piping or lining irrigation canals and ditches
- Minimizing irrigation return flows through the use of cover crops, mulch and grass filter strips
- Installing backflow devices
- Grading property to retain runoff when possible
- Confirming nozzle sizes and water pressure of the system

### Good irrigation water management practices will:

- Prevent excessive use of water for irrigation
- Prevent soil erosion
- Reduce labor
- Minimize pumping costs
- Prevent leaching of nutrients and pesticides
- Increase crop biomass yield and product quality
- Prevent water quality degradation to ground and surface water

Flood irrigation allows limited control. Distribution uniformity can be poor, with some parts of the field being over or under watered. Erosion and leaching of nutrients from saturated soils are often a concern, especially when water is flowing over sloped terrain. Although flood irrigation will never be as efficient as other irrigation systems, there are techniques that can be used to improve efficiency. These techniques include the use of gated pipe, incorporation of level or graded boards or furrows, or the use of corrugation and contour ditches.

### Sprinkler Irrigation

Sprinkler irrigation is a method of applying irrigation water that is similar to natural rainfall, where irrigation water is pumped and applied uniformly to the field. Methods of irrigation sprinkler systems include hand lines, wheel lines, big and small travel guns, pod systems, liners and pivots. Drip irrigation is also another method that can be used. Sprinkler irrigation efficiencies vary between 55 to 90%. This is dependent upon the condition of the equipment, infiltration rate of the soil and root zone management.

Sprinkler systems require power which can be expensive to install. For existing sprinkler systems there are energy incentive programs from Pacific Power or Central Electric Cooperative, INC. that can reduce power consumption and save water. For more information on energy incentives, check out: <https://www.energytrust.org> or <https://www.cec.coop>

A well managed sprinkler irrigation system will reduce soil erosion and limit leaching of nutrients and pesticides. Good irrigation water management is generally based on some combination of three basic approaches: monitoring soil moisture, applying water to the crop needs, and timing of each irrigation. Contact the OSU Extension office or the Deschutes SWCD to help improve your irrigation water management.

## Water Measurement Units

### Volume Units

**One acre-inch**  
3,630 cubic feet  
27,154 gallons  
1/12 acre-foot

**One acre-foot**  
43,560 cubic feet  
325,851 gallons

**One cubic foot**  
1,728 cubic inches  
7.481 (approximately 7.5) gallons  
62.4 pounds (approximate) (62.5 for most calculations)

**One gallon**  
231 cubic inches  
0.13368 cubic feet  
8.33 pounds (approximate)

### Flow Units

**Cubic foot per second**  
449 gallons per minute

**One acre-foot** in 12 hours and 6 minutes (approximately 12 hours) or 1.98 (approximately 2) acre-feet per 24 hours

**One gallon per minute**  
0.00223 (approximately 1/450th cubic foot per second)  
One acre-inch in 452.6 (approximately 450) hours or 0.00221 acre-inch per hour

One acre-foot in 226.3 days or 0.00442 acre-foot per day  
One inch depth of water over 96.3 square feet in one hour

**Million gallons per day**  
1.547 cubic foot per second  
694.4 gallons per minute



Information about climate, current weather and crop-watering needs: <http://www.usbr.gov/pn/agrimet/>





# Keeping Water Clean

**C**lean water is critical to all Deschutes County residents: people, wildlife and aquatic life. The Oregon Department of Environmental Quality (ODEQ), Oregon Department of Agriculture (ODA), Deschutes Soil and Water Conservation District, Deschutes County officials and local citizens are working together to protect water quality in many ways. Ultimately the responsibility for improving water quality rests with everyone who lives, works or recreates in the watershed.

ODEQ is responsible for ensuring that Oregon's waters are clean and support their uses. The Deschutes River and its tributaries have been identified as being too warm to adequately support fish and other aquatic life. These high stream temperatures are due primarily to unnaturally low stream flows in the rivers of Deschutes County, a result of irrigation diversions. In addition, excess sediment and manure in irrigation canals and ditches can cause problems for neighbors.

## Agricultural Water Quality Concerns

ODA works with landowners to prevent water pollution from agricultural activities on private and state lands. Oregon's Agricultural Water Quality Management Program includes Area Plans and Area Rules. Area Plans describe water quality goals and how to meet the goals while Area Rules prescribe water quality requirements and are enforceable by ODA. The following issues have been identified in Deschutes County:

### Low stream Flows

Low flows cause increased water temperature and changes in pH and dissolved oxygen. Increased stream flows, especially during summer months, can help to reduce or eliminate these problems. Conserve water by irrigating efficiently.

### Soil erosion

Excess soil erosion in water degrades fish habitat and clogs and wears out irrigation pumps. Soil usually enters our water through eroding banks and soil-laden irrigation run-off. You must prevent soil from eroding into streams. You may also need to prevent excess soil from entering irrigation ditches, depending on where the water is going.

### Nutrients

Nutrients are elements like nitrogen and phosphorus found in manure and fertilizer. They help plants grow, but in excess they can cause algae blooms that remove the oxygen needed by aquatic life to survive. Excess nitrogen can also pollute drinking water in wells. You must prevent your valuable manure or fertilizers from entering creeks, irrigation canals and some ditches.

### Pesticides

Improper application of pesticides can harm people, livestock, fish and wildlife. Pesticides must be applied as indicated on the label.

### Bacteria

*Escherichia coli* is found in manure and can harm humans. You should prevent manure from entering groundwater, creeks and irrigation ditches to protect yourself and your neighbors. If you have any animals confined in a dirt lot or stable, you may need a Confined Animal Feeding Operation (CAFO) permit from ODA.

### Streamside Vegetation

Plants help stabilize stream banks, reduce potential pollutants out of water flowing over the ground and shade the water. Agricultural and landscaping activities must allow plants to provide these functions along streams.

## Non-Agricultural Water Quality Concerns

Leaking septic systems, improper pesticide applications on lawns and gardens, inappropriate off-road vehicle use and suburban runoff can contribute to water-quality concerns in Deschutes County.

Increasing nitrate levels in the groundwater of south Deschutes County are of particular concern. Groundwater is the sole source of drinking water for area residents, and some wells are contaminated by residential septic systems.



Agricultural Water Quality Management Area Plan and Rules:  
[https://www.oregon.gov/oda/programs/  
NaturalResources/AgWQ/Pages/AgWQPlans.aspx](https://www.oregon.gov/oda/programs/NaturalResources/AgWQ/Pages/AgWQPlans.aspx)

# Livestock

**L**ivestock ownership provides income, companionship and additional responsibilities. Choosing the type of animal requires careful thought. The most important factor in your decision is your commitment to practice good animal husbandry and land management.

Many properties in Deschutes County have too many animals, leading to poor animal and pasture health. The appropriate number of animals is influenced by the quality and productivity of your property. The recommendations in the tables below are applicable only during the pasture growing season (May to October). You will have to provide supplemental feeds, such as hay, from November through March to maintain animal health.

The value and the productivity of property will be affected by the grazing management. Property that becomes over-grazed is susceptible to weed invasion, erosion and dust. Degradation of pastures and native range harms their visual appeal and property value.

Property that lacks adequate vegetation has increased erosion and reduced wildlife habitat

Approximate number of adult animals per acre of pasture from May to October<sup>1</sup>. Supplemental feed is needed in the winter.

Livestock	Healthy Irrigated Pasture <sup>2</sup>	Non-Irrigated Parcel (less than 50 acres)
Sheep	5	Should be used only as a part-time exercise area, NOT as a feed source. Misuse increases risk of weed invasion and conversion of vegetation to bare ground and dust.
Goats	5	
Alpacas	3	
Llamas	2	
Horses	1	
Cattle	1	
Pigs	Not Recommended	

<sup>1</sup> Dependent on management of pasture.

<sup>2</sup> No supplemental feed supplied, pasture is properly irrigated and soil fertility is at optimal level.

Weed invasion of your property can lead to weed invasion on neighboring properties and public lands.

## Choosing Livestock

Raising livestock can be rewarding for adults and children alike. Livestock can provide income, companionship and a way to learn responsibility. Responsibility for proper animal husbandry falls solely on the livestock owner. Each type of animal requires different facilities, time, care and financial commitment. Likewise, animals have been bred to serve a particular purpose. Be sure to carefully research the needs, purpose and behavioral traits of the animal in which you are interested.

Average annual costs of owning livestock may vary annually based on feed prices and the age and health of the animal.

There are specific laws regarding the disposal of dead domestic animals (ORS 601.140). For more information, contact the Oregon Department of Agriculture or the Deschutes County Department of Solid Waste.

Estimated average yearly cost of owning an adult animal, including health care and harvested feed, from October to March. Dryland pasture requires harvested feed daily to meet all of the nutritional needs.

	Healthy Irrigated Pasture (\$)¹	Native or Dryland Pasture (\$)
Sheep	90	200
Goats	90	200
Alpacas	90	200
Llamas	125	314
Horses	1188	1500
Cattle	438	1063
Pigs (six-month ownership)	300	300

<sup>1</sup> Costs do not account for fees associated with irrigation. Estimated costs in 2009.





# Pasture & Manure

**I**rrigated pastures are complex biological systems involving soil, sun, water, plants and animals that provide forage for your animals. Think of yourself as a “grass farmer” first and foremost. The forage is the crop; the grazing animals are the crop harvesters.

## How Grass Grows

To maintain healthy grass pastures and livestock, a general rule of thumb is to manage grass height so that it ranges between three to eight inches high. These management heights vary by grass species. Graze the pasture when eight inches tall. Rotate the animals to the next pasture when grass is three inches tall.

## The Deschutes SWCD has free pasture sticks available to help identify grass height.

- Grass plants must have adequate leaf area (solar panels) to photosynthesize optimally
- Photosynthesis is the process of converting the sun’s energy into plant biomass.
- Plants with few leaves have fewer roots, making it more difficult to absorb necessary nutrients and water from the soil.
- Grass roots are actively growing in the spring and the fall; the roots are “shedding” in the summer and winter.
- Grass plants store most of their food reserves in the crown area (bottom two to four inches) of the plant. These stored food reserves consist of sugars and non-structural carbohydrates. Grasses utilize food reserves for regrowth and to survive periods of dormancy. (Legumes store most of their food reserves in the root.)

Growth rates grasses vary seasonally. In general, our Central Oregon cool-season grasses grow rapidly in the spring (until about June 21), then go through a “summer slump” of reduced growth, then grow more rapidly in late summer to early fall, and then go dormant until spring. Managing for proper fall stubble height is important. Regrowth in the fall contributes to next year’s first grazing or first cutting of hay.

The more green leaves, the quicker the plants will regrow to provide forage for animals. If grass is grazed short when the roots are actively growing (spring and fall), then the summer slump and winter dormancy will negatively affect grass growth and will negatively affect grass growth even more the following year. Fall is the worst time to graze grass very short.

Legumes, like alfalfa and clover, grow better than cool-season grasses in hot weather. Clover can take over an overgrazed pasture in the summer because of its heat tolerance and comparative leaf-area advantage.

## Fertility

Pasture plants need nutrients, such as nitrogen, phosphorus, potassium and sulfur, as well as other nutrients to grow properly. Grazing can either concentrate or remove soil nutrients within the pasture; therefore, a fertility plan should be developed. Conduct a soil fertility test every three to four years (ideally in the fall) to determine what kind and how much fertilizer is needed and then monitor over time.

## Irrigation

Grass plants can efficiently use about 50% of the available water from the soil. Grasses will extract water to a depth of two to three feet, depending on grass species and soil depth. Once half of the available water has been used, it is time to irrigate. Daily plant water requirements vary based on factors such as air temperature, solar radiation, day length, wind and

growth stage of the plant. Agrimet Crop Water Use Program is a useful tool that predicts water use or evapotranspiration (ET) on a daily and weekly basis. OSU Extension Service and the Soil and Water Conservation Districts can provide information on irrigation principles and management.

### **Grazing Management**

Proper grazing can maintain a pasture in good health for years. Properly grazed pastures produce more forage, erode less easily, are not weedy, and contribute to good animal health. Managing proper grazing height contributes to good animal health by minimizing threats of parasites (short grass height increases the chance of parasite infection) and optimizes animal nutrition. Grass stores food reserves in the crown area, and overgrazing can cause health problems for horses that need “low-carb” diets. Plants are overgrazed when these sugar/carbohydrate reserves are continually depleted without enough time for the plant to replenish those food reserves. One reason that animals overgraze is because the animals desire the sugars and carbohydrates in the crown area of the plant.

Management-intensive Grazing (MiG) is a great way to manage pastures and can increase pasture production. This can be accomplished by using temporary electric fencing to divide a pasture into multiple paddocks and rotate the animals through the paddocks (subdivisions of larger pastures). The animals graze in a paddock until the desired minimum plant height is reached. This minimum grass height varies seasonally and could be between two and eight inches. The animals are then rotated into the next best paddock with the most forage. The size, shape and

number of paddocks will vary, depending on location of the water source, irrigation system, number of animals, approximate length of grazing time desired by the manager and manager lifestyle. The length of time animals graze in a paddock depends on feed availability and ending grazing height desired.

Temporary electric fencing works well for crossfencing, especially when starting out and trying to figure out if permanent cross fences are desired. Non-permanent electric fencing offers more long-term management options.

Animals tend not to graze where they have urinated and defecated. The distribution of those nutrients will depend upon grazing management. MiG aids in better manure and urine redistribution in the paddocks by modifying grazing behavior.

Remember, grass growth varies seasonally, and the pasture can support more animals in the spring and early summer than in the summer and fall. Grass growth in the early spring is slow, so maintain proper grazing height to allow immediate regrowth once animals are rotated to the next paddock. As the weather warms, grass grows much faster, and it’s usually difficult for the animals to keep up with forage growth from mid-May to mid-June. To keep grass from growing too tall and losing forage quality during this time, rotate animals through the paddocks quickly, increase the number of animals temporarily or harvest the excess forage for hay. If custom haying is needed, schedule this well in advance.

When there is not enough grass to support your animals, move them into an all-season pen and supply supplemental feed. Ideally, the all-season pen has a surface of gravel, sand,



or hog fuel, and gutters and downspouts are installed on barns to divert water away from the pen. Preventing animals from standing in mud reduces health problems. A hardened surface makes it easier to collect manure and store it away from your animals.

### Renovation of a Pasture

Before plowing up a pasture and starting over, optimize grazing and irrigation management practices for the existing pasture, as long there are desirable species and a reasonable amount of vegetation. Reestablishment of the pasture can be pondered later, if more production is desired or needed. Changing grazing, irrigation, soil fertility and weed management practices can be a much less expensive and successful alternative to renovation.

### Burning a Pasture

Fire can be a useful management tool to aid in controlling diseases and insects. Fire can also cause irreparable damage. The hotter the fire, the more harm it can do. Remember, food reserves in the plant crown are being burned off if fire is used as a tool. Grass species have different tolerances to fire. Before lighting any fire, consult your local fire department for burning restrictions.

#### To Make Manure as Beneficial as Possible:

- Store it under cover and away from water sources. Keep the pile contained and on a hard surface to prevent leaching of nutrients.
- Give manure away via the manure exchange program: [www.deschuteswcd.com](http://www.deschuteswcd.com).
- Spread it, fresh or composted, on pastures, one-quarter to one-half inch at a time. If spread fresh, allow enough time before allowing animals to graze the pasture.
- Compost it to create a beneficial soil amendment with fewer pathogens and weed seeds, increased organic matter and less odor than fresh manure.



### Managing Manure

Harrow or drag pastures to help manure piles break down more quickly and recycle the nutrients back into the soil. Harrowing also exposes parasite larvae in the manure to sun and air, helping to break the parasite cycle. If animal health is still a concern, pick up manure from pastures and compost it properly before returning it to the pasture. Application of composted manure increases soil organic matter, fertility and water-holding capacity of the soil.

### Use manure. Don't waste it. Manure contains valuable organic matter and plant nutrients.

If you don't manage manure properly, bacteria, nitrogen and phosphorus can create problems for people, streams, irrigation water and wells. Fresh manure can contain parasites and bacteria that can cause serious livestock health problems and pathogens (*E. coli*) that can harm humans. Applying fresh manure directly to pastures and gardens can contaminate them. Fresh manure may also have strong odors and attract flies.



The average 1000-pound horse produces 9 tons or 11 cubic yards of manure per year!



# Weeds

If not managed, your property could be a source of weeds that cause problems for you and your neighbors. Allowing weeds to grow unchecked on your property is a recipe for disaster.

## What is a Weed?

Almost any plant may be considered a weed if it grows in an unwanted place. The most problematic weeds are invasive and non-native. All non-native plants do not become invasive. Invasive, non-native weeds reproduce rapidly and aggressively invade areas traditionally inhabited by native vegetation. Weeds can out-compete native plants because they have no natural competitors to keep their population in check. Some winter-annual weeds, such as cheat grass and medusahead rye, grow when other plants are not yet growing.

## Noxious Weeds

Noxious weeds are plants that have been legally designated by the state or county as serious pests because they are injurious to public health, agriculture, recreation, wildlife or public and private property. Noxious weeds have become one of the largest ecological and economic threats to the State of Oregon and Deschutes County.

**Invasive noxious weeds annually cost Oregonians over \$83.5 million due to economic loss to agriculture, natural resources and recreational activities.**

## Why Care About Invasive Weeds?

Our ecosystems rely on the native vegetation that makes up the foundation of the food chain. When weeds displace desirable plants, they can permanently alter our natural environment and diminish the available food and cover for native wildlife. Weedy areas are also prone to soil erosion from wind and rain. Weeds can also reduce the economic viability of our community's farms and ranches.

[www.deschuteswcd.org](http://www.deschuteswcd.org)

## Preventing Weed Growth

Prevention is the most effective and least costly form of weed control. Good management practices can help maintain desirable vegetation. Sound practices include purchasing weed-free hay and birdseed, avoiding over grazing, planting certified grass seed; and washing vehicles, waders, boots and clothing after being in a weed-infested area. Early detection and rapid response to weed infestations is very beneficial in preventing weed growth.

## Managing Weeds

A stand of healthy, desirable plants is the most effective weapon against weeds. Weeds are opportunists that use available resources to spread. Disturbing soil and removing or suppressing established vegetation creates opportunities for weeds. Foot traffic, wheel traffic and cultivation disturb soil, while excessive mowing, grazing or fire can suppress established vegetation. Land used for high-traffic activities requires extra efforts to manage weeds.

Herbicides can be an effective, necessary and environmentally sound tool to manage weeds. Selective herbicides can control broadleaf plants without injuring grasses. Selective herbicides are particularly effective when used to reduce competition from weeds with desirable plants.

- Cost-share options to help treat selected species and a support network to help manage these species are available through the Deschutes County Weed Board. Contact the Deschutes County Vegetation Manager for more information.
- OSU Extension Service has brochures to aid in plant identification. Staff can suggest plants to replace noxious species and herbicides and other control methods.
- Neighbors are often a good source for identifying noxious weed problems on prospective property. Let neighbors know that you care and are actively managing your property.





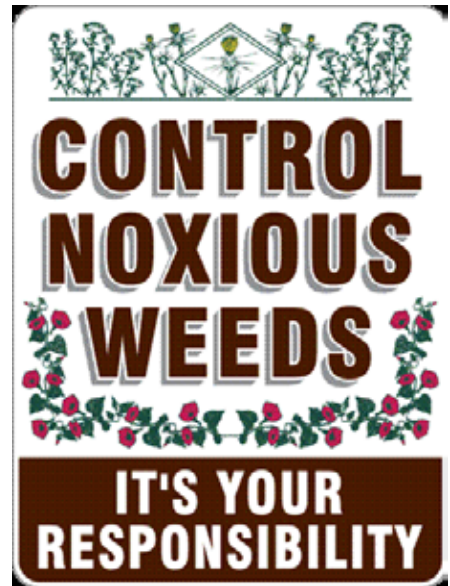
**SPOTTED KNAPWEED**



**SCOTCH THISTLE**



**WATER HEMLOCK**



**ORANGE HAWKWEED**



**PUNCTUREVINE**



**HAIRY NIGHTSHADE**



**BLACK NIGHTSHADE**



**DALMATION TOADFLAX**



**YELLOW FLAG IRIS**

# Common Nuisances



**P**ests can range from the deer that eat your roses to mites on your orchard grass to skunks living under your deck. All of these can challenge the quality of life that made you choose to live in the country. However, they can also be prevented through various means.

## Crop Diseases and Insect Pests

Severity of these problems will vary from year to year and crop to crop. Many of these pests can cause real economic damage. Insect pests of forage and cereals include alfalfa weevils, thrips, aphids, cereal leaf beetles, mites and aphids.

Root and fungal diseases common to the area include verticillium wilt on alfalfa and mint, rust and scald on grasses and white rot on garlic and onions.

Some of these diseases and pests can be treated with chemical pesticides. Other methods include rotating crops, providing appropriate amount of irrigation water, fertilizing for maximum soil fertility and use of “natural” controls, such as *Bacillus thuringensis*.

## Mosquitoes

Mosquitoes can transmit West Nile Virus and other diseases, especially to livestock. Mosquito larvae live in stagnant water. Remove sources of standing water, such as old tires. Larvae can be killed in stock tanks with goldfish or *Bacillus thuringensis*. To attract natural predators, place bat and bluebird houses on property.

## Dogs

Free-roaming dogs may kill livestock and wildlife. Livestock owners have the right to protect their animals and in some cases will destroy dogs that threaten them.

## Algae

Algae may clog your pond or irrigation ditch or grow out-of-control in your stock tank. While many algacides are on the market, you may also be successful with submerging barley straw, which can be found at many local feed stores.

## Wildlife

While we all enjoy seeing wild animals on our property, some can become nuisances including cougars, coyotes, deer, ground squirrels and even songbirds.

Several rodents may be eating your plants and digging holes in your yard. Marmots (rock chucks), voles (field mice), pocket gophers and Belding’s ground squirrels (sage rats) can be a problem for both irrigated and dryland fields. These rodents damage the vegetation and can also create holes and mounds in the fields. There are various control methods, including baits, traps, burrow builders, gas cartridges, rifle, barn cats and raptor perches.

Deer and elk can damage crops, trample fields or tear apart hay bales. They also can destroy electric fencing you may have put up to help rotate your animals through pastures.

Hawks, owls and coyotes are notorious for both eating those pesky rodents but also picking off your cats and small dogs.



**Do NOT feed the deer. Doing so may bring in unwanted wildlife, such as cougars.**

## Tips

- Avoid attracting predators and pests by not leaving pet or livestock food outdoors.
- Bring pets in at night and secure livestock in predator proof shelter.
- Drape netting over plants to protect from wildlife browsing and build fences at least eight feet tall to exclude wildlife from gardens and haystacks.
- Select landscaping plants that wildlife do not prefer to eat. OSU Extension Service has plant lists.
- Close off entrances to buildings and below decks and foundations to prevent wildlife from using these structures for cover.
- Contact the Oregon Department of Fish and Wildlife (ODFW) for advice, permits or other considerations in dealing with these problems.



# Rangeland

**A**lmost 50% of Deschutes County is rangeland: non-farmable, non-forested land that consists primarily of grasses, shrubs and junipers. Rangeland productivity is limited by rainfall and soil type. Annual precipitation ranges from 8 to 20 inches. Seasonal precipitation patterns increase the challenge of managing activities such as grazing livestock, enhancing wildlife habitat, controlling noxious weeds and recreation.

Most rangelands in Deschutes County are managed by the Bureau of Land Management. However, 27% are privately owned and may be part of your property.

## Ecology of Rangelands

Most of Deschutes County is covered with deposits of pumice and other volcanic materials spewed over the countryside by Mt. Mazama's eruption 6500 years ago. The high porosity of pumice soils makes it very difficult to use land management practices and concepts common on conventional soils. On rangelands in eastern Deschutes County, the depth of pumice and whether buried soils exist beneath the pumice influences the type of grasses that will be found.

## Western Juniper – Friend or Foe?

Western juniper grows mostly in eastern Oregon, but it also is found in northeastern California, northwestern Nevada, southwestern Idaho and southern Washington. In 1936, the US Forest Service estimated that junipers grew on approximately 1.5 million acres. Today's estimates show that juniper has expanded to approximately nine million acres. Juniper is supremely adapted to extracting water from the soil.

The pumice sand and fractured basalt landscapes of eastern Deschutes County support some of the oldest known western junipers, with some trees estimated to be more than 1200 years old. While juniper is native, it was originally confine to rocky areas by wildfire. Fire suppression has allowed juniper to invade grass and shrub lands, leading to elevated catastrophic fire risks, loss of sage grouse habitat, increased soil erosion, reduced plant diversity, noxious weed expansion, flash floods, and drier soils. Additionally, overgrazing from cattle and sheep destroyed the fragile soil biotic crust, native herbaceous layer, and exposed the topsoil to the elements.

This created conditions favorable to juniper recruitment and eventual dominance. However, Juniper is controllable through various methods of cutting, often combined with burning. Junipers, especially older ones, provide important habitat for wildlife, such as shade for deer, perches for hawks and owls and nest holes for chickadees and squirrels.

[Click here to learn more about the management of Western Juniper.](#)

## Grazing Management

Unlike grazing systems developed for irrigated pastures, grazing systems for rangelands must depend on weather, especially precipitation and growing-season temperatures. For most native grasses, the growing season begins in late March or early April and ends by mid July.

Grazing systems are unique to each area. Grazing systems are designed so that animals are rotated through pastures during the grazing season and control the amount of forage consumed by controlling the length of the grazing period, season of use and length of the rest or non-use period. While it is common to see livestock on rangelands, any parcel of less than 50 acres is likely to turn into dust and weeds if animals are on it full-time. Parcel size (particularly small parcels) limits the flexibility in designing grazing systems that protect plant health and reduce risks of weed invasion and soil erosion.

Developing a source of livestock drinking water is key to successfully grazing rangelands. Sources are ground water, springs, streams and collection devices known as guzzlers. Technical assistance for developing water sources is available from the Natural Resources Conservation Service and the Oregon Department of Fish and Wildlife.

## Water Right

Water rights may be necessary for water developments (for example, springs) if the surface flow leaves your property. Diversions of stream flow and use of wells for livestock water may be exempt from a water right depending on the daily volume of water used. Contact Oregon's Department of Water Resources for rules governing development of livestock water.

# Managing Forest Land

**A**ctive management of forests on your property can enhance the very things you enjoy or care about and can help protect your property from insects, disease and wildfire. In recent years, wildfires have burned hundreds of thousands of acres of private and federal forestland in Central Oregon. Can your property resist wildfire? Recent bark beetle outbreaks on federal land have killed thousands of acres of lodgepole pine forests. Is your forest healthy enough to resist bark beetle attacks?

People own forest land for a variety of reasons including having a retreat or get-away, recreating (hiking, fishing, hunting), investing, generating timber income, grazing and passing on a legacy.

## What Type of Forest Do You Have?

It's important to know what kind of forest you have, as management strategies vary by forest type. Deschutes County has three primary types: lodgepole pine, ponderosa pine and mixed-conifer forests.

### Lodgepole

Pure lodgepole pine forests are found in cold-air drainages, along high-elevation rivers and creeks and surrounding cold meadows, as well as in higher plateaus. Lodgepole pine forests are created by wildfire. Because lodgepole pine forests often develop into dense stands, thinning these forests can produce bigger trees, improve the health and vigor of remaining trees and help make the stand resistant to beetles. Actively managed lodgepole pine forests have fewer insect and disease problems.

### Ponderosa Pine forest

Ponderosa pine forests are common in central Oregon just above the western juniper woodland/sagebrush plant community and below the mixed conifer forest. Ponderosa

pine forests are found on dry, more southerly slopes in flatter terrain where it is too dry for lodgepole pines. Younger ponderosa pine forests are much denser than the historic old-growth pine forests, mostly because periodic fires are no longer allowed to burn through these forests. Many young, dense ponderosa pine forests are at risk to bark beetles. Thinning a ponderosa pine forest can improve tree growth and value and safeguard against bark beetles. Also, thinning subordinate trees (ladder-fuels) can reduce the risk of wildfire around homes and outbuildings.

### Mixed-conifer forest

A mixed-conifer forest is comprised of several tree species, including ponderosa pine, Douglas-fir, grand fir, western larch and lodgepole pine. The mixed-conifer forest grows often on cooler and moist north slopes and in mid-to upper-elevation creek bottoms. Because it contains a mix of tree species, it is somewhat more complex to manage. Again, thinning is an important tool to improve tree health and reduce susceptibility to wildfire. When managing a mixed-conifer forest, encourage healthy ponderosa pine, western larch and Douglas-fir.

### Laws to be Aware Of

Several laws govern the management of private forest-land in Oregon. The two most important are the Oregon Forest Practices Act and Fire Protection Regulations. Logging and forest practice activities on private lands and adjacent to streams and creeks are governed by the Oregon Forest Practices Act and overseen by the Oregon Department of Forestry (ODF). The law also governs reforestation requirements after harvest and the application of chemicals on forestland. Fire Protection Regulations address fire prevention, burning permits, operation of machinery (including chain saws) and designating fire season.



Very dense lodgepole pine forest.



Young lodgepole pine stand, recently thinned.



Thinned ponderosa pine forest around a rural home. Thinned stands are less prone to fire, insects and disease.



The Oregon Department of Forestry oversees timber harvesting regulations on private lands.

For questions regarding logging practices, permits and timber harvesting on private lands or fire regulations, contact the ODF in Prineville. For fire regulations, contact the ODF in Sisters or Prineville.

Burning on lands within the Oregon Department of Forestry Forest Protection District requires a permit and is restricted during portions of the year due to wildfire threat. Many private lands within the county fall into the Oregon Department of Forestry and local fire protection districts. It is important to call ahead and check which regulations apply in your area.

- Forestry Consultants provide personalized assistance, including having a timber cruise done, overseeing a logging operation, marketing logs and developing a management plan for landowners. They often save you money by avoiding costly mistakes. ODF Stewardship or OSU Extension Service Forester has a list of local forestry consultants.
- Oregon Small Woodland Association (OSWA) consists of over 2000 family forestland owners across Oregon. They provide educational information and promote and advocate for family forestlands, host tours and other events, produce a newsletter and publish *Northwest Woodlands*. OSWA has a chapter in Central Oregon (<http://www.oswa.org> or [oswa@oswa.org](mailto:oswa@oswa.org)).



Young ponderosa pine forest that is too dense. Bark beetles are now attacking and killing trees.



Thinned, mixed-conifer forest.

# Your Public Neighbors

**A**lmost 80% of Deschutes County is public land, most of which is managed by the Bureau of Land Management, US Forest Service and State of Oregon. Many of these lands are adjacent to or intermingled with rural private properties, sometimes creating a confusing patchwork of land ownership. (See map inside front cover.)

Much of the beautiful landscape that contributes to the quality of life in Central Oregon consists of public lands. These lands provide open space, recreation, wildlife habitat and natural resources that support local economies. Signs have been posted on many lands to remind people of their responsibilities in protecting natural resources.

The Oregon Parks and Recreation Department (OPRD) manages two parks with overnight camping in Deschutes County: Tumalo and La Pine. OPRD also manages several day use areas open to the public and oversees many activities in the Wild and Scenic River sections of the Deschutes River. The State also has parcels, usually one square mile in size, scattered throughout the county as a result of historical land trades. These lands are managed by the Department of State Lands (DSL), which contributes revenue generated by these lands to the Common School Fund.

Some activities on public lands in Central Oregon, such as organized group functions, cutting firewood or collecting plants, may require a special-use permit from the appropriate agency.

## Dumping garbage on public lands is illegal and costs taxpayers money to clean up!

### What Types of Land Management Activities Should I Expect?

If you have not lived in this part of the country, you may not be aware of land-management activities that occur on neighboring public lands. These lands are actively managed to reduce the risk of wildfire, restore healthy ecosystems, protect rare plant and animal species and produce natural resource commodities such as timber and forage to promote economic stability within local communities and industries.

- Prescribed burning (i.e., controlled fires) is often used to reduce hazardous fuels that can carry wildfire and to restore historic plant communities and habitats. Controlled burns are usually conducted in the fall after the wildfire season. The Forest Service posts signs along roads when it is conducting a burn in the area.
- Thinning and commercial timber/firewood/biomass harvest help reduce risk of wildfire, restore historic vegetation, enhance wildlife habitat and promote natural functions and processes.
- Seeding native plant species helps restore natural ecosystems and reduce weeds.
- Controlling invasive plants through spraying or pulling.
- Managing livestock grazing through allotment management plans.
- Developing recreational facilities and opportunities, including campgrounds, trails and boating facilities. Some popular trails require permits even for day hikes. Some also require that dogs be leashed.

### Be Informed and Get Involved

Find out what is happening on the public lands in your area. Ask to be included on mailing lists for land management activities. Attend public meetings, scoping sessions and other forums to participate in the management of your public lands.



The US Forest Service manages the Deschutes National Forest on the east slope of the Cascades.



Lands managed by the US Bureau of Land Management primarily line the Deschutes River near La Pine, and consist of much of the drier rangelands in eastern Deschutes County.



# Recreation

Opportunities for recreation in Deschutes County are as plentiful and diverse as they are widespread. While your own private land may provide for many outdoor interests, your public lands offer a wide variety of landscapes and amenities for adventure as well. However, as a recreationalist, you are responsible for protecting both the natural resources and your fellow outdoor enthusiasts.

Popular activities include camping, hiking, picnicking, sightseeing, snow skiing, river rafting and exploring on foot and horseback. Hundreds of migratory birds rest and refuel in Deschutes County, making bird watching more popular than hunting or fishing. Auto-touring along the highways and hundreds of miles of primitive roads scattered across the County is another favorite choice. Others bike on rugged mountain roads or paint and photograph landscapes, wildlife and wildflowers.

## Cultural Artifacts

Arrowheads and other cultural artifacts are found regularly in Deschutes County due to the historical use of this area by Native Americans. These items are protected by state and federal laws.

## Target Shooting

Under the multiple-use mandates of the Forest Service and BLM, hunting and shooting (at target ranges and appropriate dispersed shooting sites) are legitimate uses of those lands, except where specifically prohibited for safety or other reasons. Contact Deschutes County for information on areas identified as “No Shooting” zones. Safety is of the utmost concern.

## Hunting and Fishing

Fishing is common in the Deschutes and Little Deschutes rivers, Paulina and East lakes, Wickiup and Crane Prairie reservoirs and many other natural lakes and reservoirs. Hunters gather annually for rifle, bow and muzzleloader seasons for various big-game hunts, including deer, elk and antelope. Cougar, bear, bobcat, upland game birds and migratory waterfowl are also hunted. Controlled hunts generally begin mid-August and last through March. The Oregon Department of Fish and Wildlife (ODFW) sells hunting and angling licences

[www.deschuteswcd.org](http://www.deschuteswcd.org)

and tags, and ODFW sponsors educational programs for hunting and fishing.

## Camping

Camping is allowed on most Federal lands outside of established campgrounds. The State of Oregon provides camping facilities at two parks in Deschutes County.

## Power Boating

The State Marine Board regulates recreational boating in Oregon. If you are 70 or younger, you must carry a Boater Education Card when operating powerboats of more than 10 horsepower. Always clean your boat before launching; invasive mussels and other aquatic species cling to boats and are easily transported to clean waters.

## Rafting, Canoeing and Kayaking

These are popular on the Deschutes River, offering both flat and white water. However, the river can be deceptive. Deschutes River water is surprisingly cold, and kayakers or floaters can quickly become hypothermic. Dams and waterfalls cause fatalities every year, even at clearly marked hazards such as the Colorado Street Bridge in downtown Bend.

## Off-Highway Vehicles (OHV)

OHVs are allowed in designated areas on many public lands, such as the BLM Millican Valley OHV Area. Ride responsibly and do not harm wildlife and plants, which can take many years to recover in the harsh desert environment.



OHV use: <http://www.oregon.gov/OPRD/ATV/>

Cultural artifacts: <https://www.oregon.gov/oprd/OH/pages/archaeology.aspx>

Hunting and fishing: <http://www.dfw.state.or.us/resources/>

Camping: <https://www.oregon.gov/OPRD/PCB/Pages/PCB-overview.aspx>

Power boating: <https://www.oregon.gov/oprd/PRP/Documents/SCORP-Community-Park-Recreation-Planning.pdf>





# Wildlife and Habitat

One of the experiences of living in the country is having a diversity of wildlife on or near your property. Habitat conditions vary considerably across Deschutes County, providing for migratory as well as resident species and are essential for their survival.

Forested alpine mountains, shrub-covered rangelands, irrigated pastures and backyards all provide habitat important to amphibians, reptiles, birds and mammals. Wildlife presence varies with habitat and season. For instance, deer and elk often winter in the human-populated lowland and move up to the mountains in the summer. And predators such as bear, cougar and coyotes can be found in the County.

It is important to keep in mind that wildlife species have “territory” that you are moving into. While most wild animals will avoid humans, their natural instinct is to search for easy and abundant forage, prey and cover. This may include your garden, lawn, ornamental trees and shrubs, livestock, pets and buildings. Precautions can be taken to avoid or minimize conflict.

Habitat is essential for wildlife survival. Food requirements vary depending upon the particular wildlife species and their need for plants, animals or both as a food source. Water on or near your property in the form of a pond, stream, wetland, developed stock water or flood irrigation increases the variety of wildlife you can support. Covers help animals hide from predators, travel and nest, and covers provide shelter from harsh weather. Good habitat provides enough space for multiple individuals and species.

Many people are unaware of the value of dead, dying and hollow trees and logs for wildlife. Dead trees and down wood provide homes to more than 80 species of birds, mammals, reptiles, amphibians and fish in our area. Plants, fungi, mosses and lichens also benefit from dead and dying trees and shrubs. Consider leaving snags (standing dead trees) and downed woody material on your property.

### Pets

Keep pets under control and bring them in at night to avoid predators. Don’t let pets roam. Free-roaming cats can be a major predator themselves, killing or injuring songbirds, small mammals, reptiles and amphibians. Larger dogs can sometimes become predators, especially if roaming in packs, and can be legally shot if found chasing livestock or wildlife. Large predators can also prey on roaming dogs.

- Consider planting native plant species first. Native wildlife evolved with and benefit from native vegetation. Contact the OSU Extension Service for publications describing deer-resistant plants and ideas to reduce deer damage in your yard.
- Plant a diversity of vegetative types and heights.
- Select plants that flower and bear fruit at different times of the year.
- Leave snags and some downed woody material for perching, hiding and nesting.
- In the absence of snags, enhance the property with bat boxes and bird houses to encourage these cavity nesters that often feed on insects.
- Provide perches for hawks and owls to enhance their rodent-control presence.
- Develop water sources for wildlife.
- Remove old fencing and other hazards that may trap or injure wildlife.
- Thin dense stands of juniper to encourage a diverse plant community, reduce soil erosion, increase infiltration of rain and soil into the soil and reduce floods.

## Wildlife Habitat = Food + Water + Cover + Space

You can help increase wildlife survival by protecting, restoring and enhancing wildlife habitats. Maintaining a diversity of native vegetation, providing water and protecting special habitat features, such as rock piles and dead trees, supports a diversity of wildlife. By learning the necessary elements of habitat for each wildlife species, you can manage your property to provide for these requirements.





# Fish and Habitat

**W**hile the Deschutes River is known internationally as a fly-fishing destination, much of the watershed is still affected by both historic and current human activities. Deschutes County is growing as rapidly as any county in the nation. A bird's-eye view of the Deschutes River watershed reveals an increasingly urbanized or industrialized condition in addition to affects from agriculture, logging, roads, recreation, suburbs, dams and destination resorts.

Migratory (anadromous) fish were eliminated from Deschutes County following construction of the Pelton-Round Butte Hydropower complex. Wychus Creek was especially important for steelhead (which are now listed as "threatened" under the Federal Endangered Species Act), while most Spring Chinook salmon were in the Metolius River. Sockeye salmon lived in the Metolius River and used Suttle Lake for rearing. Reintroduction of these three fish species into Wychus Creek and the Metolius River began in 2007, with a goal of naturally producing, self-sustaining populations.

Resident fish species are red-band trout, bull trout, mountain whitefish and other non-game fish. All Columbia River Basin bull trout are Federally threatened.

In addition to these native fish, many fish have been introduced into Deschutes County, including large and small mouth bass, red-eared sunfish, bluegill, black crappie, brown bullhead, Atlantic salmon, German brown trout and eastern brook trout. These fish can be found in reservoirs and many small ponds, both private and public. Regulations exist to keep these fish from harming native fish and other aquatic life.

## Protecting Habitat

Many streams, rivers, lakes and ponds have degraded fish habitat: eroded banks, fish passage obstacles, silt where clean gravel once awaited spawning salmon and reduced water quality and quantity. Loss of streamside vegetation, spread of noxious weeds and reduced stream flow diminish the quality and quantity of fish habitat. Pollutants and elevated nutrient levels are a concern as well.

So what can you do as a landowner? Maintaining a vegetative buffer next to creeks, rivers, lakes, ponds and wetlands is a good way to protect water resources while also enhancing and wildlife habitat on your property. Many federal and state programs can help you with advice and possible funding of projects.

Even if your property is not located by a river or creek, you can improve watershed function and water conservation through management of your property's vegetation. Here are a couple of examples:

- Use native dry land plant species when landscaping or restoring sites on your property. This vegetation has evolved with the limited amount of participation we receive in Central Oregon and will require little or no irrigation once established.
- Thin dense stands of juniper to allow more rain and snow to filter into the soil and replenish ground and surface water. This also reduces the likelihood of flash floods.

## ■ Changes in Agricultural Water Use That Can

### Improve the Life of Fish

- If your property has irrigation rights that you don't need, you can lease or sell the water back instream. Contact the Deschutes River Conservancy ([www.deschutesriver.org](http://www.deschutesriver.org)).
- Efficient application of irrigation water (such as sprinkler instead of flood) can leave more water in rivers.
- Screening irrigation pumps and diversions can reduce direct mortality of fish. Contact The Oregon Department of Fish and Wildlife.
- Providing off-channel livestock water protects wet habitat from trampling, erosion and contamination by livestock wastes, while at the same time providing an improved, clean drinking source for farm animals. Animals prefer drinking from a water trough.



# Solid Waste Disposal and Recycling

**T**he Department of Solid Waste oversees the management of solid waste in Deschutes County. For waste disposal, the facility provides five transfer stations. Knott Landfill Recycling & Transfer Facility, the only operating landfill in the County, is currently estimated to remain open until 2029.

The Department of Solid Waste provides free disposal for residentially-generated household hazardous waste (HHW). The HHW collection facility, located at the Knott

Landfill Recycling & Transfer facility, is open on the second and fourth Friday and Saturday of each month from 9:00 a.m. to 3:00 p.m. To dispose of business-generated hazardous waste, contact the Solid Waste office (541-317-3163 or [www.deschutes.org/sw](http://www.deschutes.org/sw)).

Deschutes Recycling, LLC and all five transfer stations provide full recycling services. Other recycling depots in Deschutes County provide basic commingled and glass recycling service.



More information about solid waste disposal or recycling or maps and directions: Deschutes County Solid Waste (541-317-3163 or [www.deschutes.org/sw](http://www.deschutes.org/sw))

## Commingled Materials

These items may be mixed for recycling:

- newspaper
- magazines, catalogs and phonebooks
- plastic – bottles and tubs six inches or larger (yogurt containers, butter tubs, sour cream, cottage cheese containers)
- nursery plant pots four inches or larger, plastic buckets (five gallons or less) and milk jugs
- tin/aluminum (cans, jar lids, foil, TV dinner trays and beverage cans)
- paper bags
- mixed paper (junk mail, shredded paper in strips only (no cross-cut or confetti), cereal/cracker/shoe boxes, soda and beer cartons, paper egg cartons and paper towel tubes)

## Not Recyclable

These items may not be recycled:

- plastic bags, film, foam/expanded plastics, bottle and tub lids, trays, clamshell containers, bakery containers, biodegradable plastics and styrofoam
- frozen food boxes, paper cups/plates/towels/napkins, pet food bags, paper ream wrappers, tissue paper, waxed paper and candy wrappers or snack food bags

## Garbage & Recycling Services

### Bend Republic Services

541-382-2263  
20835 Montana Way, Bend  
[www.republicservices.com](http://www.republicservices.com)  
Services: North of Greenwood Ave. in Bend & rural Bend

### Cascade Disposal

541-382-6660  
1300 SE Wilson Ave., Bend  
<https://cascadedisposal.com/>  
Services: South of Greenwood Ave. in Bend & rural Bend

### Redmond/Sisters Republic Services

541-548-4984  
1090 NE Hemlock Ave., Redmond  
[www.republicservices.com](http://www.republicservices.com)  
Services: Redmond/rural Redmond & Sisters

### Wilderness Disposal

541-536-1194  
51420 Russell Rd., La Pine  
[www.wildernessgarbage.com](http://www.wildernessgarbage.com)  
Services: La Pine

### Deschutes Recycling, LLC

541-388-1910  
Located at Knott Landfill Recycling & Transfer Facility

## Solid Waste Disposal Sites

### Knott Landfill Recycling & Transfer Facility

541-317-3163  
61050 SE 27th Street, Bend  
[www.deschutes.org/sw](http://www.deschutes.org/sw)

### Negus Transfer

2400 NE Maple Way, Redmond

### Northwest Transfer

68200 Fryrear Rd., Sisters

### Southwest Transfer

54580 Hwy 97, La Pine

### Alfalfa Transfer

off Walker Road

### Information Line

541-388-6599



# Contributors

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**Oregon State** | Extension  
UNIVERSITY | Service

# Resource Directory

## Deschutes Soil & Water Conservation District.....

..... 541-923-4358

## United States Agencies

Farm Services Agency .....	541-923-4358
Natural Resources Conservation Service .....	541-923-4358
Bureau of Land Management.....	541-416-6700
Bureau of Reclamation.....	541-389-6541
Fish & Wildlife Service.....	541-383-7146
Forest Service – Deschutes National Forest	
Sisters.....	541-549-7700
Bend.....	541-383-5300
Fire Use and Woodcutting.....	800-523-4737

## Deschutes County

Assessor.....	541-388-6508
Building .....	541-388-6575
Community Development.....	541-388-6575
Central Oregon Interagency	
Dispatch Center .....	541-388-0185
Dog Control.....	541-693-6911
Forester.....	541-322-7117
Open Burning .....	541-322-6335
Planning & Zoning.....	541-388-6575
Roads.....	541-688-6581
Sheriff .....	541-388-6655
Solid Waste.....	541-317-3163
Surveyor .....	541-388-6581
Weed Management.....	541-322-7117

## Deschutes County Fire Departments

Emergency.....	911
Bend Fire Dept .....	541-322-6300
Black Butte .....	541-595-2288
Camp Sherman.....	541-595-2288
Cloverdale.....	541-388-2345
Deschutes County #2 .....	541-318-0459
LaPine.....	541-536-2935
Sisters .....	541-549-0771
Sunriver.....	541-593-8622

## Chambers of Commerce

Bend.....	541-382-3221
La Pine.....	541-536-9771
Redmond.....	541-923-5191
Sister.....	541-549-0251
Sunriver.....	541-593-8149

## Upper Deschutes Watershed

<b>Council</b> .....	541-382-6103
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## Oregon State Agencies

Agriculture .....	503-986-4550
Water Quality .....	541-617-0017
Department of State Lands.....	541-388-6112
Environmental Quality.....	541-388-6146
Fish & Wildlife	
Bend.....	541-388-6363
Prineville.....	541-447-5111
Forestry	
Prineville.....	541-447-5658
Sisters.....	541-549-2731
Parks & Recreation.....	541-389-7275
Transportation.....	541-388-6180
Water Resources.....	541-388-6669

## Oregon State University Extension Service

Deschutes County – Redmond .....	541-548-6088
Crook County – Prineville .....	541-447-6228
Jefferson County – Madras.....	541-475-7107
Central Oregon Agricultural Research Center .....	541-475-7107

## Solid Waste and Recycling

Knott Landfill.....	541-317-3163
Solid Waste Recorded Information .....	541-388-6599
Deschutes Recycling LLC.....	541-388-1910
Negus Transfer Station (Redmond).....	541-548-7232

## Power Utilities

Central Electric Coop .....	541-548-2144
Pacific Power & Light .....	800-221-7070
MidState (Sunriver/La Pine) .....	541-536-2126

## Conservation Partners

Bachelor Realty.....	541-389-5516	Newton Consultants.....	541-504-9960
Botanical Developments .....	541-617-5926	Swalley Irrigation District .....	541-388-0658
Carl W. Hopp, Attorney .....	541-388-3606	The Ditch Company.....	541-420-6223
Cascade Pump & Irrigation Services.....	541-389-7867	Thompson Pump & Irrigation Inc. ....	541-382-1438
David Evans & Associates Inc. ....	541-389-7614	Upper Deschutes Watershed Council .....	541-382-6103
Deschutes River Conservancy.....	541-382-4077	William Smith Properties Inc. ....	541-382-6691
Pape Machinery Construction & Forestry.....	541-633-7671		

See links at [www.deschuteswcd.org](http://www.deschuteswcd.org)